Station 4 8

JUL 28 2003

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 633895

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
DST Integrity Project	DST Project & Maintenance Eng.	N/A
5. Proj./Prog./Dept./Div.:	**6. Design Authority/Design Agent/Cog. Engr.:**	**7. Purchase Order No.:**
DST Integrity Project	Chris E. Jensen	N/A
8. Originator Remarks:		**9. Equip./Component No.:**
None		241-AP-105
		10. System/Bldg./Facility:
		DST
11. Receiver Remarks:	**11A. Design Baseline Document?** ☐ Yes ☒ No	**12. Major Assm. Dwg. No.:**
		N/A
		13. Permit/Permit Application No.:
		N/A
		14. Required Response Date:
		23 July 03

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	RPP-15764	All	0	Ultrasonic Inspection	EQ	1	1	
				Results for Double-Shell				
				Tank 241-AP-105 - FY 2003				

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
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(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority N/A									
		Design Agent N/A									
1	1	Cog. Eng. CE Jensen		7-16-03	55-16						
1	1	Cog. Mgr. BH Thacker		7-16-03	55-16						
1		QA WL Adams	WL Adams	7/16/03	55-07						
		Safety N/A									
1	1	Env. TL Faust	TL Faust	7/22/03							

18.	19.	20.	21. DOE APPROVAL (if required)
22 July 03	22 July 03	7-25-03	Ctrl No. N/A
Signature of EDT Originator / Date	Authorized Representative for Receiving Organization / Date	BH Thacker Design Authority/ Cognizant Manager / Date	☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	DST Project & Maintenance Eng.	Date 23 July 2003
Project Title/Work Order		EDT No. 633895
Ultrasonic Inspection Results for Double-Shell Tank 241-AP-105 - FY 2003		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
RP Anantatmula	R1-14	X			
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BK Everett	S5-07	X			
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TC Oten	S5-07				X
RL Schlosser	R1-14	X			
BH Thacker	S5-10				X
JO Ferguson	S5-03	X			

A-6000-135 (10/97)

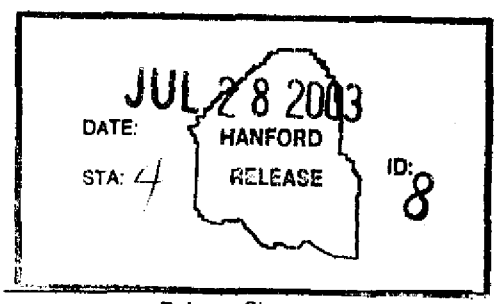
ULTRASONIC INSPECTION RESULTS FOR DOUBLE-SHELL TANK 241-AP-105 - FY 2003

Chris E. Jensen
CH2M HILL HANFORD GROUP, INC.
Richland, WA 99352
U.S. Department of Energy Contract DE-AC27-99RL14047

EDT/ECN: EDT 633895 UC:
Cost Center: 7G220 Charge Code: 500449
B&R Code: Total Pages: 1606 JA 7-28-03

Key Words: Ultrasonic, inspection, examination, UT, DST

Abstract:
This report documents the required ultrasonic examination of double-shell tank 241-AP-105 performed during FY 2003. This examination included specified primary wall areas, welds, and lower knuckle. Results indicated that there was no reportable wall thinning, cracking, or pitting in any of the plate areas examined.



7/28/03
Release Approval Date

Release Stamp

Approved For Public Release

RPP-15764
Revision 0

ULTRASONIC INSPECTION RESULTS FOR DOUBLE-SHELL TANK 241-AP-105 – FY 2003

C.E. Jensen

CH2M HILL Hanford Group, Inc.

Date Published
July 2003

Post Office Box 1500
Richland, Washington

Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-99RL14047, Modification M030

Ultrasonic Inspection Results for Double-Shell Tank 241-AP-105 – FY 2003

July 2003

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Prepared for:

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CH2M HILL Hanford Group Inc.

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CONTENTS

ATTACHMENTS

FIGURES

TABLES

TERMS

ASME	American Society of Mechanical Engineers
CH2M HILL	CH2M HILL Hanford Group, Inc.
COGEMA Engineering	COGEMA Engineering Corporation
DST	double-shell tank
DSTIP	Double-Shell Tank Integrity Project
FY	fiscal year
HAZ	heat-affected zone
JCS	Job Control System
NDE	Nondestructive Examination
PCSACS	PC Surveillance Analysis Computer System
PDT	Performance Demonstration Test
PNNL	Pacific Northwest National Laboratory
PUREX	Plutonium Uranium Extraction Facility
RL	U.S. Department of Energy, Richland Operations Office
RMS	Root Mean Square
T-SAFT	Tandem Synthetic Aperture Focusing Technique
TWINS	Tank Waste Information Network System
TWRS	Tank Waste Remediation System
UT	Ultrasonic Testing
WDOE	Washington State Department of Ecology

EXECUTIVE SUMMARY

Background

Through FY 1999, six double-shell tanks were ultrasonically examined to meet the integrity requirements of Washington Administrative Code, Chapter 173-303, Dangerous Waste Regulations. Subsequent to the examinations, integrity assessment reports were issued for each double-shell tank farm and submitted to the Washington State Department of Ecology in FY 1999. In June 2000, the Washington State Department of Ecology issued Administrative Orders 00NWPKW-1250 and 00NWPKW-1251 providing prescriptive examination requirements for all double-shell tanks by FY 2005. This report documents the required ultrasonic examination of double-shell tank 241-AP-105, completed in the third quarter of FY 2003.

Methodology

The primary wall examinations consisted of a vertical 30 inch strip consisting of two 15 inch ultrasonic examination scans, and a horizontal 15 inch by 240 inch strip encompassing the historical liquid-air interface. The primary wall examinations were looking for wall thinning, cracking, and pitting in the tank wall. The weld heat affected zones examined included 25 linear feet of vertical welds and 22 linear feet of horizontal welds. These examinations were performed using the P-scan nondestructive examination technique.

The ultrasonic examinations were carried out in accordance with ASME Boiler and Pressure Vessel Code, Section V, "Nondestructive Examinations". The personnel and non-destructive examination equipment were qualified to perform the examinations on the double-shell tanks by performance demonstration tests administered by Pacific Northwest National Laboratories.

The required accuracy for the ultrasonic examinations is to be within 0.020 inches for wall thinning, 0.050 inches for pitting, and 0.10 inches for cracking. The performance demonstration test revealed that the examiners meet this requirement.

Results

Results indicated that there was no reportable wall thinning in any of the plate areas examined. This included both the primary wall vertical scans and the historical liquid-air interface horizontal scan. In addition, there were no reportable pitting indications nor any crack-like indications detected in any of the plates.

There were also no crack-like indications detected in any of the weld heat-affected zones. This included the primary tank vertical weld scans and the knuckle-to-shell horizontal weld scan. In addition, there were no reportable wall thinning nor reportable pitting indications detected in any of the weld heat-affected zones.

Conclusions

Based on the results of this examination, the material condition of the tank is satisfactory for continued operation.

The tanks inspected to date are summarized in the following table.

Double-Shell Tanks Inspected Through May 2003

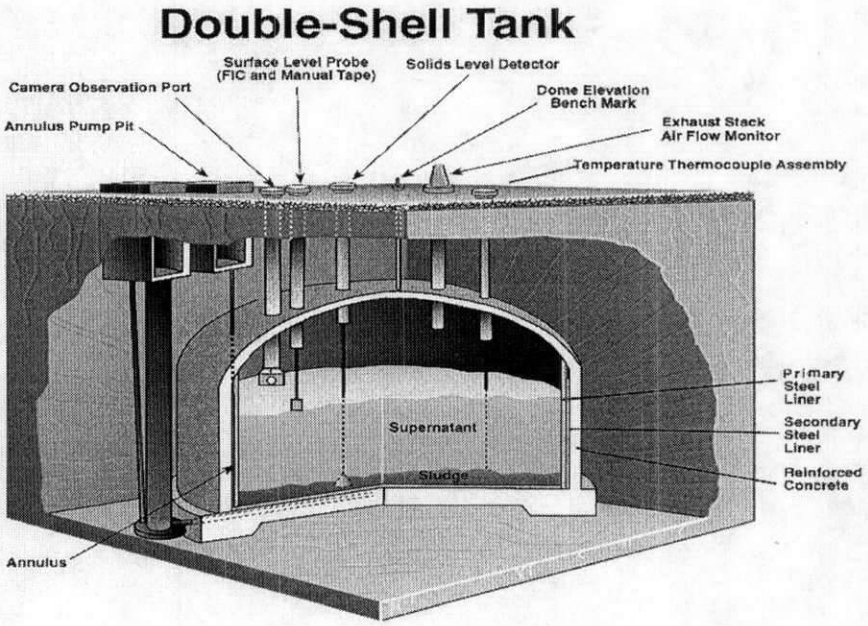
Double-Shell Tank	Inspection Year (FY)						
	1997	1998	1999	2000	2001	2002	2003
AN-101						X	
AN-102					X		
AN-105			X			(1)	
AN-106			X				
AN-107		X					
AP-101							X (3)
AP-103							X (4)
AP-105							X
AP-107				X			
AP-108				X		(2)	
AW-101					X		
AW-102						X	(5)
AW-103	X						
AW-104						X	
AW-105					X		
AW-106						X	
AY-101					X	X	
AY-102			X				
AZ-101			X				

(1) Limited scope reexamination.
(2) Linear indication evaluated.
(3) Includes primary knuckle Tandem Synthetic Aperture Focusing Technique (T-SAFT) examination.
(4) Linear indication detected; Further evaluation recommended.
(5) Primary knuckle T-SAFT examination only.

1.0 INTRODUCTION

In May 1996 the Tank Waste Remediation System (TWRS) Decision Board recommended, and U.S. Department of Energy, Richland Operations Office (RL) agreed, that the condition of the double-shell tanks (DST) should be determined by ultrasonic testing (UT) inspection of a limited area in six of the 28 DSTs (Figure 1-1). The Washington State Department of Ecology (WDOE) agreed with the strategy of limited ultrasonic inspection of DSTs. Data collected during the UT inspections will be used to assess the condition of the tank, judge the effects of past corrosion control practices, and satisfy a regulatory requirement to periodically assess the integrity of waste tanks.

Figure 1-1. Typical Double-Shell Tank Configuration.



In November 1996, DST 241-AW-103 was the first tank inspected to determine if Hanford DST walls could be inspected without removing the existing surface rust and scale. Equipment similar to that used to perform routine inspections of oil tanks and large pipelines was used. UT sensors were mounted on a remote-controlled crawler that used magnetic wheels to affix itself and move about on the tank walls. The crawler was deployed into the tank annulus and vertically traversed the primary and secondary containment walls to collect data on the wall thickness and the size of any pits or cracks. The successful completion of this inspection met the requirements of RL Milestone T21-97-455 and represented the first UT inspection of a Hanford DST (*Final Report - Ultrasonic Examination of Tank 241-AW-103 Walls*, Leshikar 1997).

In fiscal year (FY) 1998, FY 1999, and FY 2000, similar inspections were performed per Engineering Task Plans HNF-2820 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks*, Pfluger 1999) and RPP-5583 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2000*, Jensen 2000) on 241-AN-107, 241-AN-106, 241-AN-105, 241-AY-102, 241-AZ-101, 241-AP-107, and 241-AP-108. An

attempt was made to examine 241-AY-101 in FY 1999, but corrosion product on the tank wall prevented reliable examination.

In June 2000, WDOE issued an Administrative Order requiring UT examinations of the remaining 20 DSTs through FY 2005 (*Administrative Order No. 00NWPKW-1251, Failure to Comply with Major Milestone M-32 of the Tri-Party Agreement*, Silver 2000). Based on the results of the above listed eight DST inspections and per WDOE Administrative Order requirements (Silver 2000), Engineering Task Plans RPP-6839 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2001*, Jensen 2000a), RPP-7869 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2002*, Jensen 2002), RPP-8867 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks 241-AP-108, 241-AY-101, and 241-AZ-102 - FY2002*, Jensen 2002a), and RPP-11832 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2003*, Jensen 2002b) were prepared for ultrasonic DST inspections scheduled for FY 2001, FY 2002, and FY 2003.

In FY 2001, UT inspections were performed on four DSTs: 241-AN-102, 241-AW-101, 241-AW-105, and 241-AY-101 (following cleaning of selected areas of the 241-AY-101 wall). In FY 2002, UT inspections were performed on five more DSTs: 241-AN-101, 241-AW-102, 241-AW-104, 241-AW-106 and 241-AY-101 (a more extensive examination of 241-AY-101) . The FY 2002 examination of 241-AP-108 was limited to characterization of the linear indication found in FY 2000. In addition, a limited scope reexamination of the upper walls of tank 241-AN-105 was performed in FY 2002. A primary knuckle inspection on 241-AW-102 using the Tandem Synthetic Aperture Focusing Technique (T-SAFT) not completed during FY 2002 was completed in early FY 2003.

DST 241-AP-105 was the second of four tanks selected for inspection in FY 2003 (the others being 241-AP-101 [completed], 241-AP-103 and 241-AZ-102). Inspection of tank 241-AP-105 was completed in the third quarter of FY 2003, and is the subject of this report. The services of COGEMA Engineering Corporation (COGEMA Engineering) were retained to provide UT examinations, procedures and inspectors, and report the inspection results. Examination of 241-AP-105 was performed with UT equipment provided by CH2M HILL Hanford Group, Inc. (CH2M HILL).

2.0 OBJECTIVE AND SCOPE

This report describes the inspection system, evaluates the inspection results, and documents findings with conclusions and recommendations. The inspections were conducted in accordance with the criteria and scope set forth in RPP-11832 (Jensen 2002b) for the FY 2003 UT inspection of DST 241-AP-105.

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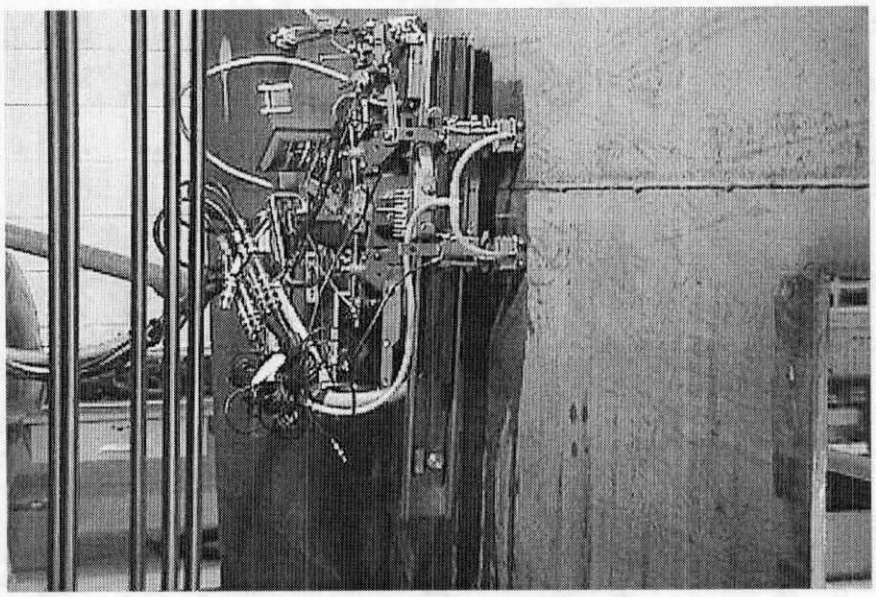
3.0 INSPECTION EQUIPMENT DESCRIPTION

Crawler / Scanning Bridge System – The crawler is a remotely controlled device that delivers the ultrasonic transducers to the tank walls. The crawler used during P-scan imaging weighs approximately 30 pounds and has dimensions (including its traveling bridge) of approximately 21 inches wide by 18 inches long by 6 inches high. The traveling bridge on the crawler can be outfitted with various ultrasonic transducer configurations (Figure 3-1).

Figure 3-1. P-scan Crawler System on Tank Mock-up.



The P-scan crawler systems is deployed through a 24 inch annulus inspection riser using a customized deployment tool. The crawler attaches to the tank wall with two pairs of magnetic wheels. As the crawler moves slowly forward the transducers glide from side-to-side over the tank wall surface. Water couplant is continuously fed to each transducer at a rate needed to maintain an acceptable signal.

Deployment Tool – A deployment tool was specifically designed to insert and retrieve the scanning system into and out of the DST annular space. The scanner sits on a platform that is manually lowered to the appropriate elevation. The platform has cables attached that can be controlled to move the scanner platform into contact with the examination surface. The scanner is then driven onto the surface. The deployment tool is retracted until the scanner needs to be removed from the annular space.

P-scan – P-scan is the name of the computerized pulse-echo ultrasonic inspection system used by the inspection vendor. The P-scan system is manufactured by Force Institute in Denmark. It acquires data from zero and angle beam transducers mounted on the crawler, allows real-time analysis, and records the data in electronic memory for post inspection analysis. Force Institute has designated "P-scan mode" to represent the angle beam (flaw length) view and "T-scan

mode" to represent the zero beam (thickness) view. T-scan mode is used for normal operation and, if crack-like indications are detected, then the P-scan mode is employed.

During normal T-scan and P-scan operations, the waveforms of the reflected sound wave signals for each transducer are displayed in the "A-scan monitoring mode". The displays are continuously monitored (but not saved), and are primarily used to verify that the transducers are functioning properly (e.g., there is proper probe contact, adequate water flowing, and correctly operating transducer cables). When an indication is detected, the area is rescanned using the "A-scan recording mode". The recorded A-scan waveforms are then reviewed off-line, serving as an additional tool in the evaluation of the indication.

Overview Camera – This camera was deployed to observe the area immediately around the inspection area and to aid crawler deployment in the annulus.

Side-view Camera – This camera and light system were installed in a riser adjacent to the inspection riser to provide an overall view of the inspection process.

Riser Enclosure – A modular structure that is placed over the inspection riser. This structure is used to combat adverse weather conditions and supplies an internal hoist for deployment of equipment.

Data Acquisition Control Center – A pull-type trailer was used to house the crawler controls, video monitors, and data collection and evaluation hardware. The trailer was located inside the AP Tank Farm boundary fence.

4.0 UT INSPECTION DESCRIPTION

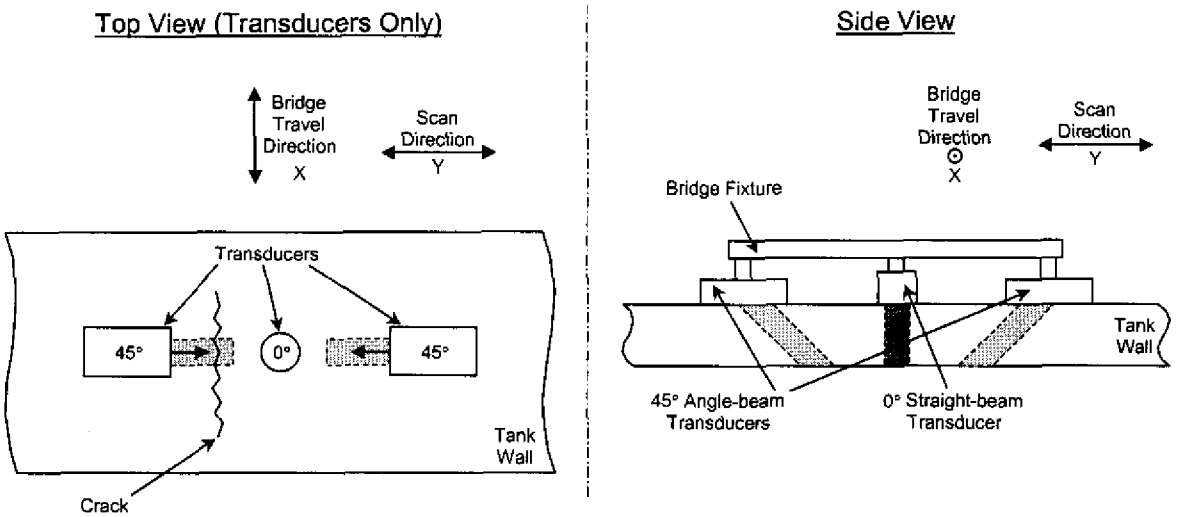
The following is the description of the data collection methodology:

Tank inspection was performed under Job Control System (JCS) work package number 2E-02-1540. All work steps, guidelines, procedures, personnel responsibilities, and protocol for the inspection (Jensen 2002b) were included in the subject work package. The COGEMA Engineering procedure that establish the methods, equipment and requirements for the P-scan imaging system UT measurements and flaw detection is *Automated Ultrasonic Examination For Corrosion And Cracking*, COGEMA-SVUT-INS-007.3 (Attachment 1).

The remotely controlled, steerable crawler was used to deliver the P-scan UT transducers to the tank wall (Figure 3-1). The crawler was deployed through the 24 inch diameter annulus inspection Riser Number 031 to perform the vertical wall scans, the horizontal liquid-air interface wall scans, and the vertical and horizontal weld scans.

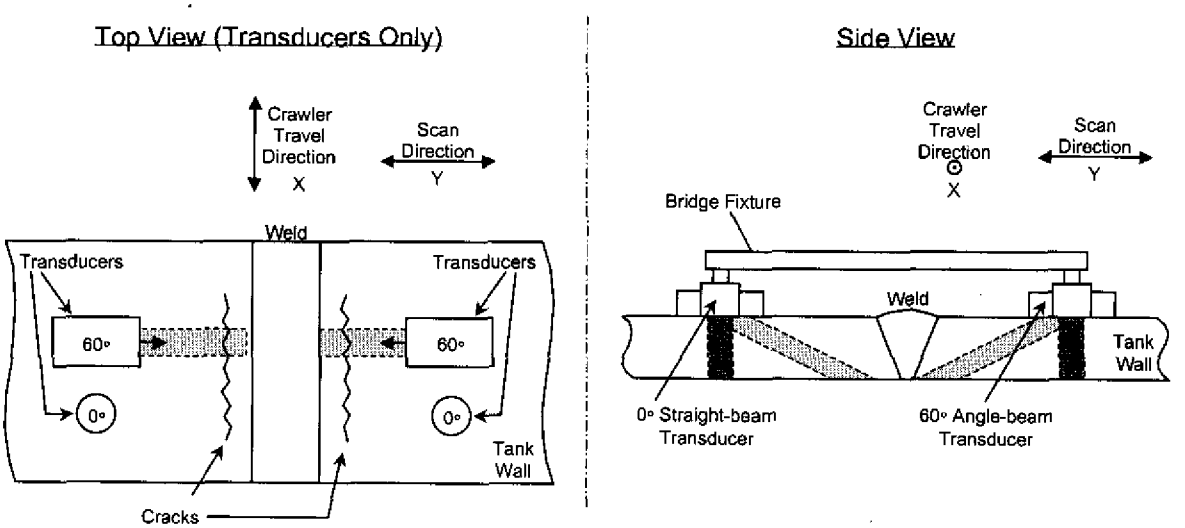
The P-scan crawler inspects the primary tank wall using one dual-element 0 degree transducer to detect wall thinning and corrosion pitting, and two 45 degree shear-wave transducers to detect cracking transverse to the scanning direction. This examination setup is illustrated in the Figure 4-1 schematic. To detect cracks parallel to the weld, a 60 degree shear-wave transducer was directed toward the weld and a dual-element 0 degree transducer is also included to detect wall thinning and corrosion pitting (Figure 4-2). To detect cracks oriented perpendicular to welds, two opposing 45 degree shear-wave transducers were directed parallel to the weld. Welds were examined from both sides of the weld crown (Figure 4-3). Note that weld and weld examination refer to the UT examination of the heat-affected zone (HAZ).

Figure 4-1. Schematic of UT Setup for Vertical Wall Inspection



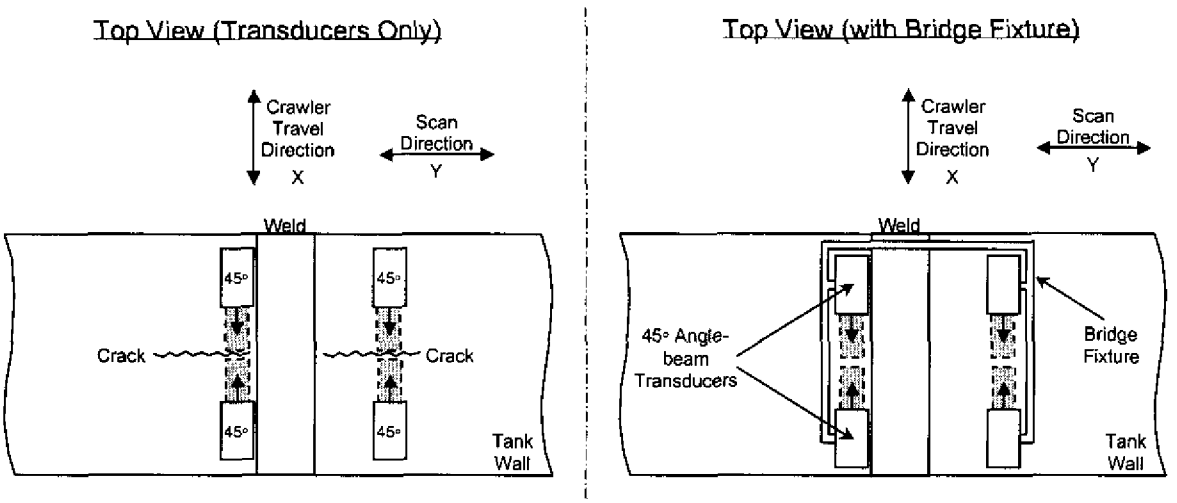
Vertical Wall Inspection Setup – Uses two 45° Transducers and one 0° Transducer (Inspect for Wall Thinning, Pitting and Axial Cracks)

Figure 4-2. Schematic of UT Setup for First Pass of Weld Inspections



First Pass of Vertical and Horizontal Weld Inspection – Uses two 60° Transducers and two 0° Transducers (Inspect for Wall Thinning, Pitting and HAZ Cracks Parallel to the Weld)

Figure 4-3. Schematic of UT Setup for Second Pass of Weld Inspections



Second Pass of Vertical and Horizontal Weld Inspection – Uses four 45° Transducers (Inspect for Heat-Affected Zone Cracks Perpendicular to the Weld)

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5.0 INDICATION REPORTING CRITERIA

COGEMA Engineering was required to report to the customer the following anomalies:

- Wall thinning that exceeded 10 percent of the nominal wall thickness
- Pit depths that exceeded 25 percent of the nominal wall thickness
- Cracks that exceeded 0.1 inch in depth.

The reporting criteria is established to identify indications that should be tracked. This tracking is to be used to determine if there is any active mechanism causing additional thinning, pit growth, or crack growth, based on subsequent examinations on the eight to ten year examination interval. The values are nominally 50% of the "acceptance criteria" established in *Acceptance Criteria for Non-Destructive Examination of Double-Shell Tanks* (Jensen 1995) and recommended in *Guidelines for Development of Structural Integrity Programs for DOE High-Level Waste Storage Tanks* (Bandyopadhyay et al. 1997).

For indications exceeding the "acceptance criteria", actions are initiated to evaluate the operability of the DST (Jensen 2002) through the occurrence reporting process. Indications exceeding the "reporting criteria" are reported to the CH2M HILL Project Engineer to be documented in the inspection report (Jensen 2002).

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6.0 PERFORMANCE DEMONSTRATION TEST

Prior to field use, COGEMA Engineering personnel satisfactorily completed a performance demonstration test (PDT). The test was conducted to qualify personnel, test procedures, and ensure the equipment's ability to detect and size wall thinning, pits, and cracks in a series of test plates with artificial defects. The performance demonstration test was performed on a tank mock-up in the 306E Facility located in the Hanford Site 300 Area. This mock-up also demonstrated the successful deployment and retrieval of the equipment. The PNNL report, "*Report on Performance Demonstration Test – PDT, May 2000,*" (Attachment 3 of *Ultrasonic Inspection Results of Double-Shell Tank 241-AP-108*, Jensen 2000b) provides the details of the complete evaluation of the P-scan system PDT.

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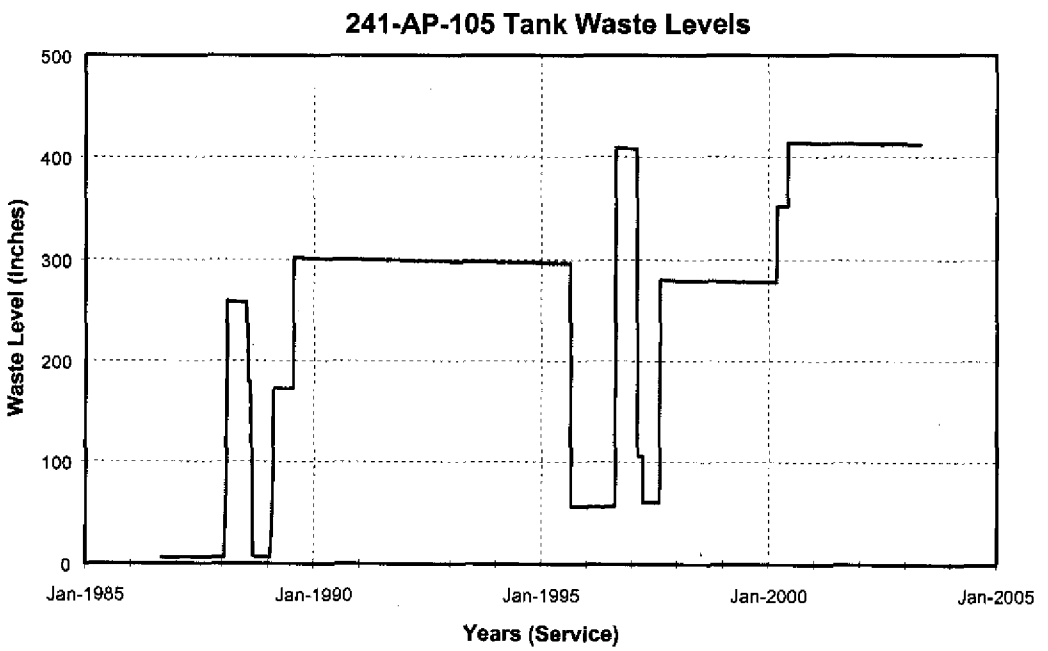
7.0 TANK 241-AP-105 HISTORY

The 241-AP Tank Farm consists of eight DSTs located in the 200 East Area of the Hanford Site. These underground tanks were built from 1983 through 1986, and are 75 feet in diameter with an operating capacity of 1.16 million gallons.

Tank 241-AP-105 entered service in 1986. It began receiving non-complexed waste and continued to receive this waste until June 1989. From July 1989 until March 1994, the tank waste was designated as double-shell slurry feed waste (*Supporting Document for the Southeast Quadrant Historical Tank Content Estimate for AP-Tank Farm*, Brevick et al., 1995). It is currently designed for storage of complex waste that is the concentrated product from the 242-A Evaporator process. The tank currently contains approximately 1,130,000 gallons of waste equivalent to approximately 411 inches: 1,041,000 gallons of supernatant (378 inches), and 89,000 gallons of sludge (33 inches) (*Waste Tank Summary Report for Month Ending February 28, 2003*, Hanlon 2003).

The waste level history since September 1986 is shown in Figure 7-1, based on data obtained from the Tank Waste Information Network System (TWINS)[1].

Figure 7-1. Waste Level History of Double-Shell Tank 241-AP-105.



[1] TWINS, http://twins.pnl.gov:8001/twins.htm, queried 05/12/2003 [Data Source: Measurements, SACS, Surface Level, Tank Name AP-105, All Measurement Date values]

Since February 1989, the minimum recorded waste level was approximately 55 inches (January 12-13, 1996). The maximum recorded waste level was approximately 414 inches, occurring on June 5-6 2000. During the period from July 1989 to August 1995, the level remained relatively constant between 296 and 302 inches, averaging 299 inches. Since June 2000, the level has also been relatively constant, averaging 413 inches.

Recorded temperatures of the tank have ranged from a maximum of 111°F (February 13 and September 8, 1995) to a minimum of 55°F (March 18, 1996), based on data obtained from the PC Surveillance Analysis Computer System (PCSACS)[2] and from the TWINS[3].

---

[2] PCSACS. queried 12/02/2002 [Data Source: Reading Group: Temperature, Structure: AP105, Collection System: Manual, Date Range: 01/01/1994 to 01/01/1996]

[3] TWINS, http://twins.pnl.gov:8001/twins.htm, queried 05/12/2003 [Data Source: Measurements, SACS, Tank Temperature Readings, Tank Name AP-105, All Measurement Date values]

8.0 GENERAL REQUIREMENTS AND INSPECTION SCOPE

FY 2003 Contract Number 16449 specifies that the contractor provide (among others) the following deliverables to the Double-Shell Tank Integrity Project (DSTIP) organization:

- The contractor shall provide AP-105 NDE Support and Data Analysis
- The contractor shall prepare recommended engineering reports and studies as directed by the DSTIP project leads

The areas on the primary tank that were identified for UT inspection in the engineering task plan (Jensen 2002b) are described below.

Primary Tank Wall and Welds:

- A vertical strip (approximately 30 inches wide by 35 feet long) of the primary wall between the upper haunch transition and the lower knuckle. The vertical strip may be comprised of one or more strips whose total width is 30 inches.
- A horizontal strip (15 inches wide by 20 feet long) centered on the average elevation of the liquid-air interface that existed for five years or longer.
- Twenty feet of the circumferential weld joining the cylinder to the lower knuckle. One vertical weld joining the lowest shell course plates (about 10 feet of weld), and one vertical weld joining the next to the lowest shell course plates (about 10 feet of weld). A minimum of twenty (20) feet of vertical weld shall be examined.

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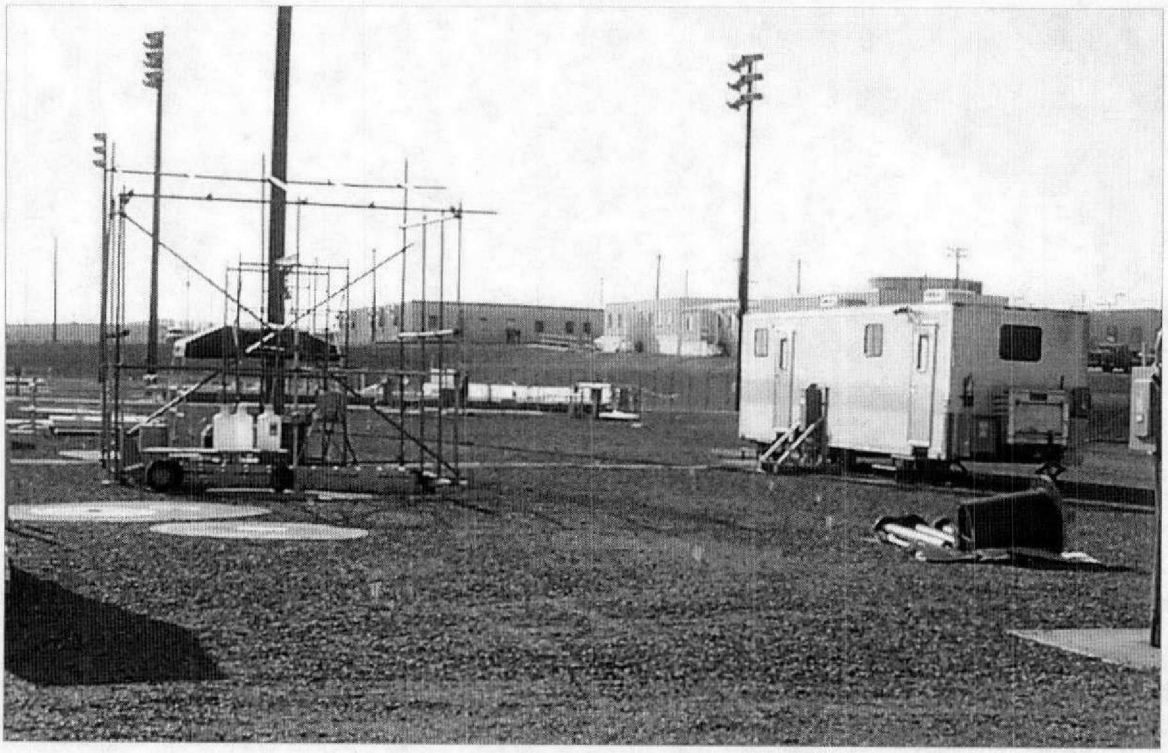
9.0 EQUIPMENT SETUP AT AP TANK FARM

Prior to performing the actual inspection, the riser (number 031, 24 inch) shield plug was removed, and a temporary cover and riser extension were secured to the riser. A portable enclosure was installed over the riser to provide the means for deploying the UT equipment and protecting the operators from the weather. An electric chain hoist, mounted to the roof frame, was used for maneuvering the equipment into position. The control center trailer was set up inside the AP Tank Farm's boundary fence, and the control cables were run along the ground to the equipment located at the riser. A typical tank farm setup for the AP-Farm is shown in Figure 9-1.

Figure 9-1. Field Set-Up at Riser for Double-Shell Tank on AP-Farm



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10.0 INSPECTION RESULTS

Tank 241-AP-105 was fabricated from carbon steel plate. The primary tank's exterior surface varies from mill scale to coatings of various degrees of rust caused by in-service corrosion of carbon steel. A description of the plates is as follows with the location of the plates as shown in Figure 10-1 (*Tank Cross Section 241-AP Tanks*, Braun-Hanford 1986).

Primary knuckle (top) – Connects dome of tank to side-wall

Primary wall – Consists of (from top to bottom)
Plate #1 – approximately 7 feet 8 inch tall, 1/2 inch nominal thickness
Plate #2 – approximately 7 feet 8 inch tall, 1/2 inch nominal thickness
Plate #3 – approximately 7 feet 8 inch tall, 9/16 inch nominal thickness
Plate #4 – approximately 9 feet tall, 3/4 inch nominal thickness
Plate #5 – approximately 2 feet tall, 7/8 inch nominal thickness

Primary knuckle (bottom) – Approximately 15/16 inch nominal thickness. Connects sidewall of tank to primary tank bottom.

The crawler was deployed through the 24 inch diameter annulus inspection Riser 031 on the west side of tank 241-AP-105 for examinations of the primary wall and vertical and horizontal welds. All tank welds examined were in the "as-welded" condition. The various scan paths for the crawler are shown in Figure 10-1, along with other pertinent tank information. Normally, for primary wall vertical scans, the first 15 inch wide Scan 1 is made directly below the annulus inspection riser, while the second 15 inch wide Scan 2 is made adjacent to Scan 1. The two scans are typically 17 to 18 inches apart, centerline to centerline. However, due to multiple strips of concrete spatter adhering to the primary wall surface beneath the riser, the two scans were performed to the right and left of the riser on areas where the wall surface was cleaner. The two scans were approximately 4 feet apart.

The UT data were examined by COGEMA Engineering's Level III certified inspector, and by Limited Level II certified inspectors. The Limited Level II inspectors were "P-Scan Limited", indicating that they are qualified to collect and examine the data, but are not qualified to interpret the data.

The following pages contain tables that present summary and detailed wall thickness data, which were derived from the COGEMA "Automated Ultrasonic Thickness Data Report Sheets". The inspection data sheets, the transducer calibration sheets, the original tank wall scan map, and an interpretation of the data by COGEMA Engineering's Level III qualified inspector are included in Attachment 2.

Tables 10-1 through 10-5 show the measured minimum wall thickness values and are displayed in a summarized form by wall plates (including the liquid-air interface near the top of Plate #2), vertical plate welds, and horizontal knuckle weld. Although the data are reported to three significant figures, the accuracy of the wall thickness data, based on the results of the performance demonstration test, is 0.012 inch root-mean-square (RMS).

Figure 10-1. Schematic of UT Scan Paths on West Side of Tank 241-AP-105 Wall (via Riser 031)

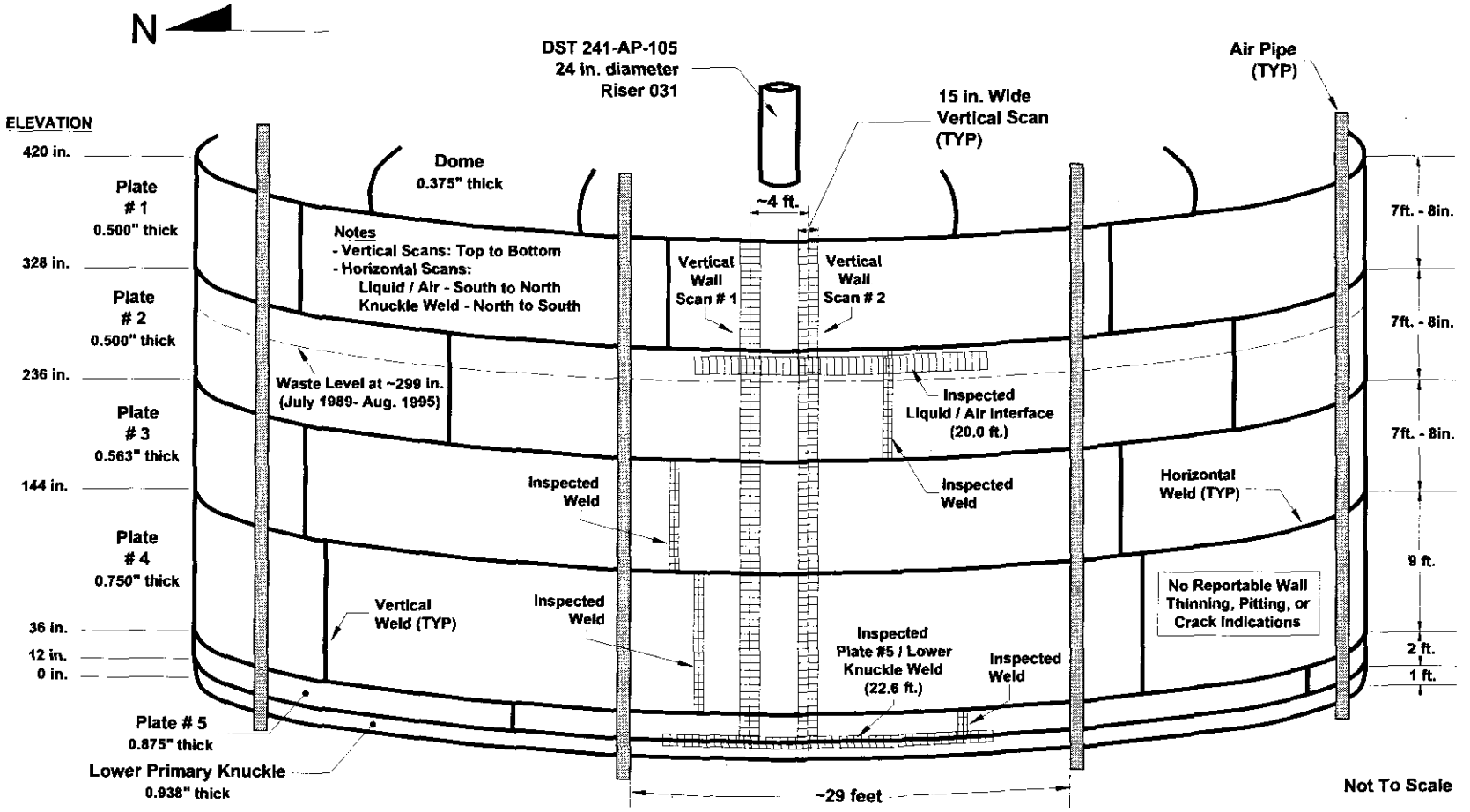


Table 10-1. Summary of Primary Tank Wall Scan 1 (via Riser 031)

Plate Description	Elevation of Wall Scan (inches)	Wall Scan Distance (inches) [1]	Design Nominal (inches)	Measured Minimum (inches)	Scan Minimum % of Nominal
Plate #1	419 to 329.6	89.4	0.500	0.479	95.8%
Plate #2	327 to 237.5	89.5	0.500	0.484	96.8%
Plate #3	235 to 145.4	89.6	0.563	0.554	98.4%
Plate #4	143 to 37.8	105.2	0.750	0.724	96.5%
Plate #5	35 to 14.2	20.8	0.875	0.856	97.8%

[1] All scan widths were 15 inches.

Table 10-2. Summary of Primary Tank Wall Scan 2 (via Riser 031)

Plate Description	Elevation of Wall Scan (inches)	Wall Scan Distance (inches) [1]	Design Nominal (inches)	Measured Minimum (inches)	Scan Minimum % of Nominal
Plate #1	419 to 334.4	84.6	0.500	0.491	98.2%
Plate #2	327 to 237.3	89.7	0.500	0.489	97.8%
Plate #3	235 to 145.0	90.0	0.563	0.568	100.9%
Plate #4	143 to 37.7	105.3	0.750	0.746	99.5%
Plate #5	35 to 13.4	21.6	0.875	0.869	99.3%

[1] All scan widths were 15 inches.

Table 10-3. Summary of Primary Tank Liquid-Air Interface Wall Scan (via Riser 031)

Plate Description	Elevation of Horizontal Wall Scan (inches)	Wall Scan Distance (inches) [1]	Design Nominal (inches)	Measured Minimum (inches)	Scan Minimum % of Nominal
Liquid-Air Interface Plate #2	323 to 308	240.0	0.500	0.473	94.6%

[1] Scan width was 15 inches.

Table 10-4. Summary of Primary Tank Weld Scans (via Riser 031)

Weld Description	Elevation of Weld Scan (inches)	Weld Scan Distance (inches) [1]	Design Nominal (inches)	Measured Minimum (inches)	Scan Minimum % of Nominal
Vertical Weld Plate #2	327 to 237.9	89.1	0.500	0.470	94.0%
Vertical Weld Plate #3	235 to 144.8	90.2	0.563	0.547	97.2%
Vertical Weld Plate #4	143 to 38.8	104.2	0.750	0.717	95.6%
Vertical Weld Plate #5	35 to 14.7	20.3	0.875	0.843	96.3%

[1] Scan widths were 9.2 – 9.5 inches.

Table 10-5. Summary of Plate #5 / Knuckle Horizontal Weld Scans (via Riser 031)

Weld Description	Vertical Location of Weld Scan	Weld Scan Distance (inches) [1]	Design Nominal (inches)	Measured Minimum (inches)	Scan Minimum % of Nominal
Horizontal Weld Plate #5 to Knuckle, Plate-side	From ~1 in. to ~4.5 in. above Plate #5 / Knuckle Weld	271.7	0.875	0.863	98.6%
Horizontal Weld Plate #5 to Knuckle, Knuckle-side	From ~1 in. to ~4.5 in. below Plate #5 / Knuckle Weld	271.7	0.938	0.899	95.8%

[1] Scan widths were 9.1 – 9.2 inches.

Tables 10-6 through 10-16 contain the detailed data for wall scans as presented in 12 inch long by 15 inch wide connecting scans. The detailed data for vertical and horizontal welds are presented in 12 inch long by 9.1 to 9.5 inch wide scans in Tables 10-17 through 10-22.

Table 10-6. Primary Tank Vertical Wall Scan 1 - Plate 1 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / Plate 1" (Page Att. 2-3)	419	0 – 12 [1]	0.500	0.515	0.480
	407	12 – 24	0.500	0.515	0.479
	395	24 – 36	0.500	0.517	0.496
	383	36 – 48	0.500	0.517	0.499
	371	48 – 60	0.500	0.517	0.497
	359	60 – 72	0.500	0.516	0.497
	347	72 – 84	0.500	0.515	0.494
	335	84 – 89.4	0.500	0.511	0.499

[1] Scan start was 1 inch below the centerline of the first horizontal weld, and centerline of marker 21 north of 24 inch Riser 031; Scan width was 15 inches.

Table 10-7. Primary Tank Vertical Wall Scan 1 - Plate 2 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / Plate 2" (Page Att. 2-5)	327	0 – 12 [1]	0.500	0.515	0.485
	315	12 – 24	0.500	0.505	0.484
	303	24 – 36	0.500	0.505	0.500
	291	36 – 48	0.500	0.505	0.496
	279	48 – 60	0.500	0.506	0.492
	267	60 – 72	0.500	0.505	0.495
	255	72 – 84	0.500	0.505	0.499
	243	84 – 89.5	0.500	0.499	0.489

[1] Scan start was 1 inch below the centerline of the second horizontal weld, and centerline of marker 21 north of 24 inch Riser 031; Scan width was 15 inches.

Table 10-8. Primary Tank Vertical Wall Scan 1 - Plate 3 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / Plate 3" (Page Att. 2-7)	235	0 – 12 [1]	0.563	0.568	0.563
	223	12 – 24	0.563	0.568	0.563
	211	24 – 36	0.563	0.570	0.564
	199	36 – 48	0.563	0.572	0.566
	187	48 – 60	0.563	0.574	0.568
	175	60 – 72	0.563	0.572	0.568
	163	72 – 84	0.563	0.571	0.558
	151	84 – 89.6	0.563	0.570	0.554

[1] Scan start was 1 inch below the centerline of the third horizontal weld, and centerline of marker 7 north of 24 inch Riser 031; Scan width was 15 inches.

Table 10-9. Primary Tank Vertical Wall Scan 1 - Plate 4 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / Plate 4" (Page Att. 2-9)	143	0 – 12 [1]	0.750	0.755	0.744
	131	12 – 24	0.750	0.755	0.749
	119	24 – 36	0.750	0.755	0.749
	107	36 – 48	0.750	0.757	0.750
	95	48 – 60	0.750	0.756	0.749
	83	60 – 72	0.750	0.755	0.750
	71	72 – 84	0.750	0.754	0.748
	59	84 – 96	0.750	0.751	0.744
	47	96 – 105.2	0.750	0.750	0.724

[1] Scan start was 1 inch below the centerline of the fourth horizontal weld, and centerline of marker 33 north of 24 inch Riser 031; Scan width was 15 inches.

Table 10-10. Primary Tank Vertical Wall Scan 1 - Plate 5 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / Plate 5" (Page Att. 2-11)	35	0 – 12 [1]	0.875	0.866	0.861
	23	12 – 20.8	0.875	0.865	0.856

[1] Scan start was 1 inch below the centerline of the fifth horizontal weld, and centerline of marker 30 north of 24 inch Riser 031; Scan width was 15 inches.

Table 10-11. Primary Tank Vertical Wall Scan 2 - Plate 1 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 1" (Page Att. 2-13)	419	0 – 12 [1]	0.500	0.515	0.491
	407	12 – 24	0.500	0.517	0.508
	395	24 – 36	0.500	0.517	0.497
	383	36 – 48	0.500	0.518	0.497
	371	48 – 60	0.500	0.518	0.501
	359	60 – 72	0.500	0.518	0.507
	347	72 – 84	0.500	0.517	0.500
	335	84 – 84.6	0.500	0.512	0.497

[1] Scan start was 1 inch below the centerline of the first horizontal weld, and centerline of marker 17 south of 24 inch Riser 031; Scan width was 15 inches.

Table 10-12. Primary Tank Vertical Wall Scan 2 - Plate 2 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 2" (Page Att. 2-15)	327	0 – 12 [1]	0.500	0.514	0.491
	315	12 – 24	0.500	0.515	0.491
	303	24 – 36	0.500	0.516	0.511
	291	36 – 48	0.500	0.516	0.508
	279	48 – 60	0.500	0.516	0.505
	267	60 – 72	0.500	0.515	0.502
	255	72 – 84	0.500	0.513	0.506
	243	84 – 89.7	0.500	0.509	0.489

[1] Scan start was 1 inch below the centerline of the second horizontal weld, and centerline of marker 17 south of 24 inch Riser 031; Scan width was 15 inches.

Table 10-13. Primary Tank Vertical Wall Scan 2 - Plate 3 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 3" (Page Att. 2-17)	235	0 – 12 [1]	0.563	0.572	0.568
	223	12 – 24	0.563	0.575	0.571
	211	24 – 36	0.563	0.578	0.573
	199	36 – 48	0.563	0.579	0.577
	187	48 – 60	0.563	0.579	0.575
	175	60 – 72	0.563	0.578	0.569
	163	72 – 84	0.563	0.584	0.574
	151	84 – 90	0.563	0.586	0.580

[1] Scan start was 1 inch below the centerline of the third horizontal weld, and centerline of marker 3 south of 24 inch Riser 031; Scan width was 15 inches.

Table 10-14. Primary Tank Vertical Wall Scan 2 - Plate 4 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 4" (Page Att. 2-19)	143	0 – 12 [1]	0.750	0.764	0.754
	131	12 – 24	0.750	0.766	0.762
	119	24 – 36	0.750	0.767	0.763
	107	36 – 48	0.750	0.767	0.763
	95	48 – 60	0.750	0.767	0.762
	83	60 – 72	0.750	0.768	0.763
	71	72 – 84	0.750	0.766	0.759
	59	84 – 96	0.750	0.763	0.756
	47	96 – 105.3	0.750	0.762	0.746

[1] Scan start was 1 inch below the centerline of the fourth horizontal weld, and centerline of marker 29 south of 24 inch Riser 031; Scan width was 15 inches.

Table 10-15. Primary Tank Vertical Wall Scan 2 - Plate 5 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 5" (Page Att. 2-21)	35	0 – 12 [1]	0.875	0.879	0.874
	23	12 – 21.6	0.875	0.877	0.869

[1] Scan start was 1 inch below the centerline of the fifth horizontal weld, and centerline of marker 26 south of 24 inch Riser 031; Scan width was 15 inches.

Table 10-16. Primary Tank Wall Historical Liquid-Air Interface Scan - Plate 2 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Horizontal Wall Scan (inches)	Horizontal Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Liquid Air Interface" (Page Att 2-23)	323 to 308 (5 inches to 20 inches below Plate #1 / Plate #2 Horizontal Weld)	0 – 12 [1]	0.500	0.515	0.497
		12 – 24	0.500	0.515	0.485
		24 – 36	0.500	0.515	0.502
		36 – 48	0.500	0.515	0.509
		48 – 60	0.500	0.515	0.509
		60 – 72	0.500	0.515	0.493
		72 – 84	0.500	0.512	0.499
		84 – 96	0.500	0.511	0.494
		96 – 108	0.500	0.513	0.483
		108 – 120	0.500	0.510	0.486
Scan "Liquid Air Interface / A" (Page Att 2-25)	323 to 308 (5 inches to 20 inches below Plate #1 / Plate #2 Horizontal Weld)	0 – 12 [2]	0.500	0.509	0.483
		12 – 24	0.500	0.506	0.480
		24 – 36	0.500	0.505	0.480
		36 – 48	0.500	0.502	0.480
		48 – 60	0.500	0.505	0.473
		60 – 72	0.500	0.519	0.489
		72 – 84	0.500	0.518	0.487
		84 – 96	0.500	0.517	0.487
		96 – 108	0.500	0.517	0.486
		108 – 120	0.500	0.517	0.494

[1] Start of scan @ marker 2 south of 24 inch Riser 031; Scan width was 15 inches.

[2] Start of scan @ end of scan Liquid Air Interface; Scan width was 15 inches.

Table 10-17. Primary Tank Vertical Wall Weld Scan - Plate 2 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Weld Scan (inches)	Vertical Location of Weld Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Weld / Plate 2" (Page Att. 2-27)	327	0 – 12 [1]	0.500	0.515	0.470
	315	12 – 24	0.500	0.515	0.502
	303	24 – 36	0.500	0.517	0.500
	291	36 – 48	0.500	0.517	0.505
	279	48 – 60	0.500	0.517	0.500
	267	60 – 72	0.500	0.517	0.510
	255	72 – 84	0.500	0.515	0.504
	243	84 – 89.1	0.500	0.512	0.497

[1] Scan start was 1 inch below the centerline of the second horizontal weld; Scan width was 9.2 inches.

Table 10-18. Primary Tank Vertical Wall Weld Scan - Plate 3 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Weld Scan (inches)	Vertical Location of Weld Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Weld / Plate 3" (Page Att. 2-30)	235	0 – 12 [1]	0.563	0.560	0.547
	223	12 – 24	0.563	0.565	0.556
	211	24 – 36	0.563	0.570	0.557
	199	36 – 48	0.563	0.570	0.547
	187	48 – 60	0.563	0.570	0.553
	175	60 – 72	0.563	0.570	0.564
	163	72 – 84	0.563	0.570	0.552
	151	84 – 90.2	0.563	0.572	0.565

[1] Scan start was 1 inch below the centerline of the third horizontal weld; Scan width was 9.5 inches.

Table 10-19. Primary Tank Vertical Wall Weld Scan - Plate 4 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Weld Scan (inches)	Vertical Location of Weld Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Weld / Plate 4" (Page Att. 2-33)	143	0 – 12 [1]	0.750	0.755	0.738
	131	12 – 24	0.750	0.760	0.740
	119	24 – 36	0.750	0.760	0.730
	107	36 – 48	0.750	0.765	0.734
	95	48 – 60	0.750	0.765	0.728
	83	60 – 72	0.750	0.760	0.727
	71	72 – 84	0.750	0.760	0.730
	59	84 – 96	0.750	0.760	0.717
	47	96 – 104.2	0.750	0.760	0.721

[1] Scan start was 1 inch below the centerline of the fourth horizontal weld; Scan width was 9.3 inches.

Table 10-20. Primary Tank Vertical Wall Weld Scan - Plate 5 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Weld Scan (inches)	Vertical Location of Weld Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Weld / Plate 5" (Page Att. 2-36)	35	0 – 12 [1]	0.875	0.870	0.846
	23	12 – 20.3	0.875	0.870	0.843

[1] Scan start was 1 inch below the centerline of the fifth horizontal weld; Scan width was 9.3 inches.

Table 10-21. Primary Tank Horizontal Weld - Plate 5 to Knuckle Scan, Plate Side (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Horizontal Weld Scan (inches)	Horizontal Location of Weld Scan, Plate Side (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Horz. Weld / Knuckle" (Page Att. 2-39)	From ~1 in. to ~4.6 in. above Plate #5 / Knuckle Weld	0 – 12 [1]	0.875	0.874	0.869
		12 – 24	0.875	0.874	0.869
		24 – 36	0.875	0.875	0.867
		36 – 48	0.875	0.875	0.871
		48 – 60	0.875	0.876	0.863
		60 – 72	0.875	0.876	0.872
		72 – 84	0.875	0.877	0.870
		84 – 94.3	0.875	0.876	0.871
Scan "Horz. Weld / KnuckleA" (Page Att. 2-43)	From ~1 in. to ~4.5 in. above Plate #5 / Knuckle Weld	0 – 12 [2]	0.875	0.878	0.871
		12 – 21.4	0.875	0.879	0.875
Scan "Horz. Weld / KnuckleB" (Page Att. 2-46)	From ~1 in. to ~4.5 in. above Plate #5 / Knuckle Weld	0 – 12 [3]	0.875	0.880	0.873
		12 – 24	0.875	0.880	0.877
		24 – 36	0.875	0.880	0.874
		36 – 48	0.875	0.880	0.873
		48 – 60	0.875	0.881	0.873
		60 – 72	0.875	0.883	0.876
		72 – 84	0.875	0.885	0.882
		84 – 96	0.875	0.887	0.874
		96 – 108	0.875	0.890	0.878
		108 – 120	0.875	0.891	0.880
Scan "Horz. Weld / KnuckleC" (Page Att. 2-50)	From ~1 in. to ~4.5 in. above Plate #5 / Knuckle Weld	0 – 12 [4]	0.875	0.890	0.882
		12 – 24	0.875	0.892	0.887
		24 – 36	0.875	0.892	0.890
		36 – 38.5	0.875	0.892	0.889

[1] Start of scan @ first air slot south of air line north of 24 inch Riser 031; Scan width was 9.2 inches.

[2] Start of scan @ vertical weld south of air line north of 24 inch Riser 031; Scan width was 9.1 inches.

[3] Start of scan @ 18.9 inches of scan Horz. Weld / KnuckleA; Scan width was 9.1 inches.

[4] Start of scan @ end of scan Horz. Weld / KnuckleB; Scan width was 9.1 inches.

Table 10-22. Primary Tank Horizontal Weld - Plate 5 to Knuckle Scan, Knuckle Side (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Horizontal Weld Scan (inches)	Horizontal Location of Weld Scan, Knuckle Side (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Horz. Weld / Knuckle" (Page Att. 2-40)	From ~1 in. to ~4.6 in. below Plate #5 / Knuckle Weld	0 – 12 [1]	0.938	0.940	0.934
		12 – 24	0.938	0.940	0.929
		24 – 36	0.938	0.940	0.921
		36 – 48	0.938	0.939	0.919
		48 – 60	0.938	0.939	0.925
		60 – 72	0.938	0.939	0.899
		72 – 84	0.938	0.940	0.907
		84 – 94.3	0.938	0.940	0.922
Scan "Horz. Weld / KnuckleA" (Page Att. 2-43)	From ~1 in. to ~4.5 in. below Plate #5 / Knuckle Weld	0 – 12 [2]	0.938	0.938	0.913
		12 – 21.4	0.938	0.939	0.918
Scan "Horz. Weld / KnuckleB" (Page Att. 2-47)	From ~1 in. to ~4.5 in. below Plate #5 / Knuckle Weld	0 – 12 [3]	0.938	0.938	0.905
		12 – 24	0.938	0.939	0.926
		24 – 36	0.938	0.938	0.927
		36 – 48	0.938	0.940	0.917
		48 – 60	0.938	0.939	0.924
		60 – 72	0.938	0.940	0.924
		72 – 84	0.938	0.945	0.920
		84 – 96	0.938	0.946	0.918
		96 – 108	0.938	0.938	0.901
		108 – 120	0.938	0.938	0.920
Scan "Horz. Weld / KnuckleC" (Page Att. 2-51)	From ~1 in. to ~4.5 in. below Plate #5 / Knuckle Weld	0 – 12 [4]	0.938	0.936	0.928
		12 – 24	0.938	0.940	0.926
		24 – 36	0.938	0.945	0.929
		36 – 38.5	0.938	0.938	0.919

[1] Start of scan @ first air slot south of air line north of 24 inch Riser 031; Scan width was 9.2 inches.

[2] Start of scan @ vertical weld south of air line north of 24 inch Riser 031; Scan width was 9.1 inches.

[3] Start of scan @ 18.9 inches of scan Horz. Weld / KnuckleA; Scan width was 9.1 inches.

[4] Start of scan @ end of scan Horz. Weld / KnuckleB; Scan width was 9.1 inches.

11.0 EVALUATION OF INSPECTION RESULTS

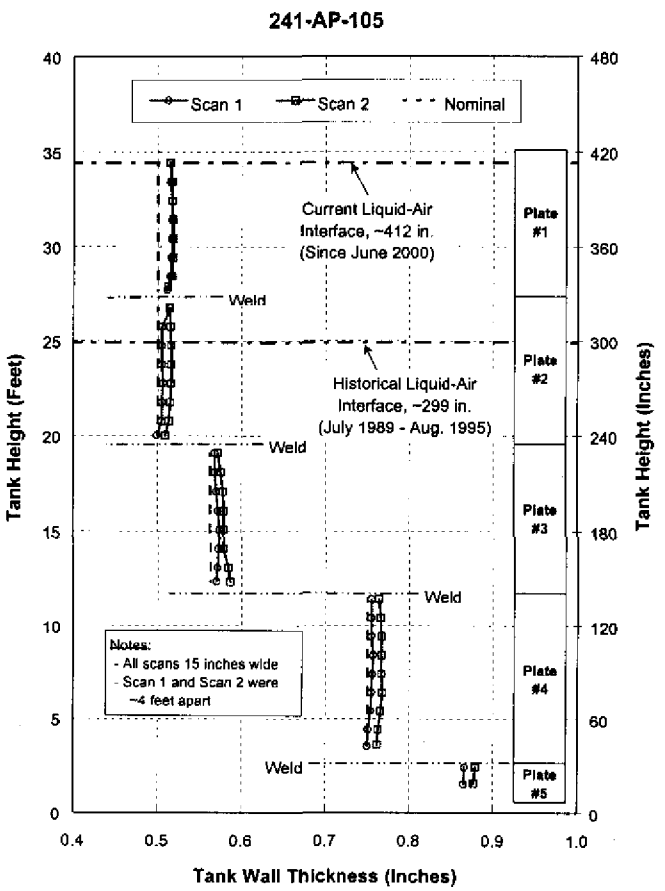
The results from the inspection of tank 241-AP-105 are evaluated and compared with results of all other tank ultrasonic inspections.

11.1 TANK 241-AP-105 UT DATA EVALUATION

The UT data were interpreted by W. H. Nelson, COGEMA Engineering's Level III certified inspector, and J. B. Elder, an independent Level III certified NDE Inspector. Mr. Elder independently evaluated the scan data and concurred with COGEMA Engineering's interpretation (Attachment 2). The data have also been evaluated by PNNL as a third party review. Their results and conclusions were found to be consistent with those described in this report. Their P-scan data review is *Ultrasonic Examination Of Double-Shell Tank 241-AP-105 Examination Completed April 2003*, PNNL report number PNNL-14293, Rev. 0 (Attachment 3).

The results of the tank 241-AP-105 UT inspection indicated no reportable wall thinning, no pit-like indications, and no cracking. Figure 11-1 shows the "as-found" measurements of the primary tank vertical wall scans generated from the Inspection Data Sheets (Attachment 2).

Figure 11-1. Scan Data Average Wall Thickness Compared to Nominal Plate Thickness



Each wall thickness measurement plotted on Figure 11-1 is the average of all data collected over a 12 inch long by 15 inch wide scan area. Areas of interest for tank 241-AP-105 are the vapor space above the current liquid waste, the current liquid-vapor interface (approximately 34.3 feet or 412 inches [since June 2000]), the liquid region, the liquid-solids interface (2.75 feet or 33 inches), the solids region, and any additional historical liquid-vapor interface regions (24.9 feet or 299 inches [from July 1989 to August 1995]). There is no evidence of any significant general thinning in any of these regions.

The UT data show that the primary tank average wall thickness values generally exceed the nominal values specified in the design documents. The UT data, when compared to construction specifications, drawings, standards, and codes (*241-AP Double-Shell Tanks Integrity Assessment Report*, Jensen 1999), reveal that the as-found condition of the tank plates and welds are all within the allowable design limits. A summary of the results associated with the areas examined is presented below.

Primary Tank Wall: Two vertical strips encompassing Plates #1 through #5 were examined. The overall average wall thickness for each plate vertical scan varied by a maximum of 0.010 inches from plate to plate (for same nominal-thickness plates). The overall average wall thickness varied by as much as 0.013 inches within the same plate (see Figure 11-1). Normally, this much variation between adjacent vertical scans would raise questions regarding repeatability of scan data. However, in this case, the vertical scans were approximately 4 feet apart (see Figure 10-1), and the variations were attributed to plate thickness differences. All overall plate wall averages were between 0.003 inches less than to 0.016 inches greater than their nominal plate thickness values. No reportable wall thinning, pitting indications or crack-like indications were found.

Primary Tank Wall Historical Liquid-Air Interface: A horizontal strip (20 feet long by 15 inches wide) near the Plate #2 historical liquid-air interface (299 inch level) was examined. The overall Plate #2 wall thickness average was 0.013 inches greater than the nominal plate thickness value. No reportable wall thinning, pitting indications or crack-like indications were found, indicating that there were no signs of waterline attack.

Primary Tank Welds: One vertical weld in each of the four lower Plates #2 through #5 was examined. No crack-like indications were found. There were also no reportable wall thinning or pitting indications found. The plate walls adjacent to the welds averaged 0.005 inches less than to 0.016 inches greater than their nominal plate thickness values.

Primary Tank Knuckle-to-Shell Weld: An approximately 22.6 feet long region of the horizontal knuckle-to-shell weld was examined. No crack-like indications were found. There were also no reportable wall thinning or pitting indications found. The plate walls adjacent to the weld averaged 0.007 inches greater than (plate side) to 0.002 inches greater than (knuckle side) than their nominal plate thickness values.

11.2 DST ULTRASONIC INSPECTION DATA RESULTS COMPARISON

The following Tables 11-1 and 11-2 provide a summary of primary tank vertical wall inspection results and a comparison of primary tank wall thinning.

Table 11-1 reports the inspection results chronologically according to fiscal year (October 1 through September 30).

Table 11-1. Double-Shell Tanks Chronological Inspection Results Findings

Tank	Inspection Year (FY)	Reportable Plate Crack Indication	Reportable Plate Pitting	Reportable Plate Thinning	Reportable Weld Thinning, Pitting or Cracking
AW-103	1997	None	None	None	None
AN-107	1998	None	None	None	None
AN-106	1999	None	None	None	None
AN-105	1999	None	None	Two very minute areas of a plate (20% maximum reduction in thickness) [a]	None
AZ-101	1999	None	None	One area of a plate (11.4% maximum reduction in thickness)	None
AY-102	1999	None	None	None	None
AP-107	2000	None	None	None	None
AP-108	2000	None	None	Two minute areas of a plate (13.8% maximum reduction in thickness).	None [b]
AW-101	2001	None	None	A pit like indication in a very minute area of a plate (16% maximum reduction in thickness).	None
AW-105	2001	None	None	None	None
AY-101	2001	None	Pit-like indication at historical liquid-air interface	Some pit-like indications identified as thinning	Three areas of 10% wall thinning in vertical welds
AN-102	2001	None	None	One minute area of a plate (11% maximum reduction in thickness)	None
AN-101	2002	None	None	One small area of a plate (12 % maximum reduction in thickness)	Four local areas near vertical welds (14% maximum reduction in thickness)

(Cont. on next page)

Table 11-1. (Cont.) Double-Shell Tanks Chronological Inspection Results Findings

Tank	Inspection Year (FY)	Reportable Plate Crack Indication	Reportable Plate Pitting	Reportable Plate Thinning	Reportable Weld Thinning, Pitting or Cracking
AW-106	2002	None	None	One small area	10.4% maximum reduction in thickness
AY-101	2002	Not Investigated	None	72 areas of >10% wall thinning, most in the historical liquid-air interface in Plate #2 (20.2% maximum reduction in thickness)	Not Investigated
AW-104	2002	None	None	None	None
AW-102	2002 & 2003 [c]	None	None	None	None
AN-105	2002	None	None	None	Not Investigated
AP-101	2003	None	None	None	None
AP-105	2003	None	None	None	None

[a] Based on a review of the tank 241-AN-105 data gathering technique in FY 1999, prompted by the FY 2002 results, the FY 1999 wall thinning data is considered questionable.

[b] Although below reporting criteria at the time, one linear crack-like indication 6 inch long by 0.142 inch deep in a nominal 0.750 inch thick plate was observed. Subsequent examination of tank 241-AP-108 in FY 2002 revealed no change in size.

[c] Primary knuckle examination using T-SAFT conducted in FY 2003.

The inspection results in Table 11-1 show that the overall condition of the inspected tanks is satisfactory. Defects or minute reportable localized plate thinning may be due to various reasons, such as fabrication defects, construction damage or in-service corrosion.

Wall thickness data gathered from ultrasonic examination of eighteen DSTs were compared to evaluate the degree of wall thinning that may have occurred among the tanks examined. These wall thickness data do not allow a direct calculation of wall thinning, since no measurements were made of original plate thickness values at the time of construction. However, wall thickness data from ultrasonic testing may be compared to the specified nominal plate thickness. This assessment used the minimum wall thickness in each scanning area (generally 12 inch by 15 inch) from the vertical wall scans and then calculated the average for each plate using the minimum thickness values.

Table 11-2 provides a summary of wall thinning, defined as nominal plate thickness minus average minimum plate thickness[4], by nominal plate size, and by DST examined. The negative values in the table indicate where the average of all minimum values of plate thickness exceeds nominal plate thickness. The Table also provides the calculated average wall thinning and

[4] Average minimum plate thickness is defined as the average of all the minimum measured thickness values for each scanning area (generally 12 inch by 15 inch) for a given plate size and DST.

associated standard deviation by DST examined for all nominal plate thickness values, and by nominal plate thickness for all DSTs examined.

Tank 241-AP-105 did not exhibit any significant thinning, with only the 0.500 inch thick Plates #1 & #2 and the 0.875 inch thick Plate #5 minimum values averaging slightly below (0.004 inches and 0.010 inches respectively) the nominal plate thickness values.

Table 11-2. Tank Wall Thinning By Nominal Plate Size

DST	FY Examined	Wall Thinning* By Nominal Plate Size (Inches)						
		0.375"	0.500"	0.5625"	0.750"	0.875"	AVG	STD DEV
AN-101	2002	n/a	0.008	n/a	0.027	0.015	0.013	0.014
AN-102	2001	n/a	0.004	n/a	0.003	0.005	0.004	0.016
AN-105	1999	n/a	0.026	n/a	0.007	0.001	0.019	0.032
AN-105	2002	n/a	0.015	n/a	n/exam.	n/exam.	0.015	0.021
AN-106	1999	n/a	0.006	n/a	0.015	0.012	0.009	0.009
AN-107	1998	n/a	-0.018	n/a	-0.015	0.013	-0.016	0.017
AP-101	2003	n/a	-0.008	-0.003	-0.002	0.010	-0.004	0.008
AP-105	2003	n/a	0.004	-0.006	-0.002	0.010	0.000	0.009
AP-107	2000	n/a	-0.011	-0.012	-0.017	-0.013	-0.013	0.008
AP-108	2000	n/a	-0.017	-0.012	-0.011	-0.005	-0.014	0.016
AW-101	2001	n/a	0.008	n/a	0.014	0.020	0.010	0.013
AW-102	2002	n/a	-0.019	n/a	-0.006	0.008	-0.014	0.012
AW-103	1997	n/a	-0.010	n/a	-0.005	0.004	-0.007	0.008
AW-104	2002	n/a	-0.036	n/a	-0.031	-0.007	-0.033	0.011
AW-105	2001	n/a	0.000	n/a	0.008	-0.003	0.002	0.018
AW-106	2002	n/a	-0.004	n/a	0.015	0.000	0.001	0.016
AY-101	2001	-0.011	0.030	n/a	0.018	0.012	0.030	0.029
AY-102	1999	-0.021	0.001	n/a	0.008	n/a	0.000	0.012
AZ-101	1999	0.021	0.027	n/a	0.020	0.003	0.024	0.011
AVG:		-0.006	0.000	-0.008	0.004	0.005		
STD DEV:		0.020	0.024	0.008	0.019	0.012		

* Thinning = nominal plate size – minimum thickness
n/a – not applicable; n/exam. – not examined

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12.0 FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The findings, conclusions, and recommendations from the UT inspection of DST 241-AP-105 are listed below.

- No reportable wall thinning was detected in any of the plate areas examined. The primary wall vertical scans (Plates #1 through #5) yielded average wall thickness values that generally exceeded the nominal values. Approximately one-half of the average minimum wall thickness values for the plates exceeded the nominal values. Of the 12 inch long vertical wall plate scans yielding minimums falling below the nominal values, the greatest deviation was 4.2% below the nominal (where reportable wall thinning is defined as greater than 10% below the nominal).

- No reportable wall thinning was detected in the historical liquid-air interface area examined. The Plate #2 horizontal scan yielded an overall average wall thickness value that was 0.013 inches greater than the nominal plate thickness value. Most of the minimum wall thickness values for the horizontal scan were less than the nominal values, the greatest deviation being 5.4% below the nominal.

- No reportable pitting indications nor any crack-like indications were detected in any of the vertical wall plate scans or the horizontal historical liquid-air interface Plate #2 scan.

- No crack-like indications were detected in any of the weld heat-affected zones. The primary tank vertical weld scans (Plates #2 through #5) and the knuckle-to-shell horizontal weld scan (Plate #5 to lower knuckle) yielded overall average wall thickness values that ranged from 0.005 inches below to 0.016 inches above the nominal values. There were no reportable wall thinning indications in any of the heat-affected zones, with the minimum wall thickness values ranging from 1.4% to 6.0% below the nominal values. In addition, there were no reportable pitting indications detected in any of the weld heat-affected zones.

- The absence of cracks in the plates and weld-heat-affected zones indicates that the pre-service material quality control, weld-stress relief treatment, and waste chemistry controls have been effective in preventing cracks.

- According to a recent Tank Integrity Assessment Project DST Lifecycle Schedule, tank 241-AP-105 is scheduled for its second UT examination in about nine years. Based on the results of this UT examination, it is recommended that this schedule be maintained – there is no reason to perform any near-term follow-up inspections on this tank. Following the second UT examination, inspection parameters such as wall thinning rates can be calculated and used to better quantify and evaluate any continual wall thinning or degradation.

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ATTACHMENT 1

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

**(COGEMA Engineering Corporation
Procedure COGEMA-SVUT-INS-007.3, Rev. 1)**

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AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

1.0 PURPOSE

This procedure establishes the method, equipment, and requirements for automated, direct contact ultrasonic (UT) straight-beam, thickness measurements, angle beam flaw detection, and sizing in carbon steel waste storage tanks utilizing the "P-scan" ultrasonic imaging system.

2.0 SCOPE

2.1 Requirements

The requirements herein are applicable to weld inspection, crack detection, sizing, wall thickness measurement, and the detection of wall thinning conditions, such as pitting, erosion, and corrosion in double shell tanks from 0.100 inches to 1.0 inches in thickness. At least one side must be accessible and the component surface to be measured must be parallel with the opposite surface. The requirements are also applicable to the automated UT detection and depth sizing of surface connected planar flaws.

2.2 Scanning

Scanning is performed using remotely controlled automatic scanners.

2.3 Examinations

Examinations shall be performed from inside the annulus of the double shell tanks.

2.4 Instructions

This procedure provides the instructions for the use of Tip Diffraction Techniques including the Absolute Arrival Time Technique (AATT), and the Relative Arrival Time Technique (RATT), for the sizing of planar flaws.

2.5 Methodology

The methodology in this procedure meets the requirements as addressed in Reference 4.1 as applicable to meet the requirements for inspection of double shell tanks.

3.0 RESPONSIBILITIES

Only certified Level II or Level III ultrasonic examiners shall interpret data to determine whether it represents relevant or non-relevant indication in accordance with the applicable specification.

Level III ultrasonic examiners shall review all data collected prior to issuing a final report.

4.0 REFERENCES

4.1 ASME Boiler & Pressure Vessel Code, Section V, Article 4, 1995 Edition.

4.2 COGEMA SV-CP-PRC-014, Qualification and Certification OF NDE Personnel.

4.3 COGEMA SVAD-PRC-001, Nondestructive Examination Administrative Procedure.

4.4 COGEMA SVUT-PRC-007, Ultrasonic Examination Procedure.

4.5 FORCE Institutes, P-scan System 4 Instruction Manual

5.0 PERSONNEL REQUIREMENTS

5.1 Personnel Qualifications

Personnel performing or supervising data acquisition or performing data analysis to the requirements of this procedure shall be qualified and certified to at least level II in ultrasonics in accordance with reference 4.2 or equivalent. In addition, they shall be trained in techniques for sizing stress corrosion cracking/planar flaws.

5.2 Certification Level

Personnel performing review for final acceptance of examination data shall be certified to at least level II in ultrasonics in accordance with reference 4.2 or equivalent.

5.3 Support Personnel

Personnel, whose responsibilities are limited to set-up, tear down, and track or scanner operation need not be certified. Such personnel shall possess sufficient knowledge of the equipment to satisfy the Level III examiner.

6.0 EQUIPMENT

6.1 Ultrasonic Instrument/Examination System

The P-scan computerized pulse-echo ultrasonic inspection system shall be used. The system shall be equipped with a stepped gain control in units of 1dB with a dynamic range of at least 115 dB, capable of generating and receiving frequencies in the range of 0.5 to 15 MHz. The following components may be used:

PS-4	P-scan processor
Analysis computer	Off-line data analysis with P-scan analysis software
Digital Controller, WSC-2S, or other approved scan controller	Automatic scanner controller
AWS-5, AWS5-D, RUTI*	Automatic P-scan scanner
Pump	Couplant pump for P-scan system

*Remote Ultrasonic Inspection (RUTI) system

6.2 Transducers

Straight-beam and angle-beam transducers with single or dual elements, with or without delay tips, may be used, provided they can be attached to and manipulated by the scanner, and can be adequately coupled to the test item with a resultant backwall signal response of at least a 2 to 1 signal-to-noise ratio. Sizes and frequencies shall be as specified for the following applications:

6.2.1 For high sensitivity applications such as the detection of pitting, erosion or corrosion, transducer sizes in the range of 1/4 inch to 1/2 inch, with a frequency in the range of 4.0 to 10 MHz, shall be used.

6.2.2 For weld inspection, detection and sizing of planar flaws that are open to the surface, angle beam transducers with a nominal angle of 45 degrees with an element size in the range of 1/4 inch to 1/2 inch, with a frequency in the range of 4.0 to 10 MHz, shall be used. Where interference from weld geometry prevents examination of the required volume with a 45-degree a 60-degree angle may be substituted.

6.2.3 Transducers of other angles, element sizes, modes of propagation, or frequencies outside the above ranges may be used to suit other required examination techniques.

6.3 Cables

6.3.1 Cables of any compatible type and number of connectors may be used for examination. The length shall be limited to 400 feet, or less where signal

degradation occurs. The same cables shall be used for calibration and examination.

6.3.2 The scanner control cable for analog scanners shall be limited to 330 feet maximum. Digitally controlled scanners shall have a maximum cable length as stipulated by the manufacture's recommendation.

6.4 Couplant

6.4.1 Site approved water should be used as couplant for the examination.

6.4.2 Couplant application should be accomplished by means of an automatic couplant delivery system whenever possible. Care should be taken to use only as much water as required, as excess water in the annulus is undesirable.

6.5 User Calibration Blocks

6.5.1 For general thickness measurements, or the detection of pitting, erosion, or corrosion, user calibration blocks shall be made of an acoustically similar material as that being measured. A standard step block with 0.1 inch or greater increments encompassing the nominal thickness to be measured shall be used.

6.5.2 For weld inspection, crack detection and sizing measurements, user calibration blocks shall be made of an acoustically similar material as that being measured. A standard notched block with 0.1 inch or greater increments encompassing the nominal thickness to be measured shall be used.

6.6 Reference Blocks

Reference blocks (e.g., Rompas, IIW, DSC) utilized for beam angle exit point determination or screen width calibration shall be of similar material composition as the component under examination.

6.7 Pulse Repetition Rate

The repetition rates are set at rates such that signal wrap-around does not occur. In addition, the rates are sufficient to pulse the transducer at least six times within the time necessary to move one-half the transducer dimension parallel to the scan direction at maximum scanning speed.

7.0 CALIBRATION

7.1 Verification of Instrument Linearity

Instrument alignment verification for screen height and amplitude control should be performed within three (3) months prior to use of the instrument or at the beginning and end of each outage period, whichever is less. Instrument linearity verification is independent of transducer or scanner characteristics. Verification with one transducer/scanner combination is valid for any other combination. The due date for alignment verification shall be recorded on the calibration sheet.

7.2 System Parameters

The system parameters used for calibration and examination should be established as outlined in Reference 4.5 as required. The system should be operated in the T-SCAN program for thickness mapping and zero degree inspection and in the P-SCAN program for crack detection, weld inspection and/or additional evaluation.

7.3 General Requirements

7.3.1 Calibration shall include the complete ultrasonic examination system. Any change in transducers, wedges, couplants, cables, instruments, recording devices, scanners, power source, or any other parts of the examination system shall be cause for system calibration check.

7.3.2 If a secondary ultrasonic system is to be used, it must be calibrated before the inspection is started and not removed from the examination system during the inspection or recalibration will be required.

7.3.3 System calibration checks and final calibration for instrument sensitivity and sweep range shall be performed on the same block used for initial calibration using at least one reflector. These checks shall be performed:

a) At the start and finish of each series of examinations.
b) At intervals not to exceed 16 hours.
c) When there is a change as described in 7.3.1.
d) If the examiner suspects a malfunction.

7.3.4 If the horizontal sweep, thickness, or "Z" positions have changed more than 5 percent of the nominal thickness, void all examinations performed after the last valid calibration verification, and reexamine the voided areas.

7.3.5 Calibration checks may be performed on either a reference block or the basic calibration block, but must include a check of the entire examination system. Calibration checks may be accomplished by static or dynamic calibration.

7.3.6 Simulated calibration checks may be used in lieu of calibration checks where the spread of contamination or serious time constraints would result from performing a standard calibration check. Simulated calibration will use blocks, cables, or transducers of similar types and lengths as those used for testing and will be documented on the calibration data sheet. A baseline, simulated calibration shall be performed immediately after performing the initial calibration, or after a calibration check where the entire examination system is utilized. The initial simulated calibration check values are independent of the values obtained utilizing the entire examination system. The established tolerance applies to the subsequent simulated calibration checks.

7.3.7 During calibration, the temperature of the calibration block should be within 25 degrees of the ambient inspection temperature.

7.4 Calibration Process for Thickness Mapping / T-scan

The basic process for calibration is the same for thickness mapping (T-scan), weld inspection, flaw detection, and sizing. The calibration reflectors for straight beam are the backwall reflections from a step wedge. The reflectors for angle beam transducers are the notch base and tips from a notched block. The calibration process is as follows:

7.4.1 Select and connect the appropriate transducer(s), input the parameters, including thickness, frequency, index delay, gates, inspection method(s), and velocity. Apply the couplant to the applicable points on the calibration standard. (Select a sufficiently thin step for detection of unexpected low reading or pits and a step greater than the maximum thickness expected).

7.4.2 Place the transducer(s) on the calibration step nearest to the nominal thickness of the item to be examined. Adjust the gain control to produce a reflection of 80% full screen height (FSH). Input this gain level as the reference level. Obtain a response from the other calibration points, and verify that they produce an acceptable signal. Initial calibration accuracy

will be within +/- 0.010". in T-scan. Perform steps 7.4.1 and 7.4.2 for each physical transducer being used.

7.4.3 Position the transducer to produce a response from the smaller of the two (2) steps to be used for calibration. Using the scan menu, collect a reading from that step. The transducer may be removed from the scanner and remain stationary "static" while the scanner is manipulated to make a larger indication on the screen.

7.4.4 Position the transducer on the thicker step and collect data from that step. Using the level control, measure the thickness from each step. Adjust the system to read the correct thickness with index delay and velocity if needed.

7.4.5 Repeat these steps as required until the system is accurately measuring the thickness over the entire inspection range with each transducer/active inspection. During initial calibration, all intermediate steps within the inspection range should be confirmed.

7.4.6 The vital parameters used for the calibration shall be identical to the inspection parameters with the exceptions of file name(s), X, Y and Z ranges, reference level compensations, thickness, gates or comment parameters which may be adjusted as required.

7.4.7 At a minimum, readings from the thinnest and thickest calibration reflectors shall be recorded for each applicable transducer on the Automated Ultrasonic Thickness Calibration Sheet (Attachment 4).

7.5 Calibration Process for Weld Inspection / Crack Detection / P-scan

7.5.1 Select and connect the appropriate transducer(s), input the parameters, including thickness, frequency, index delay, gates, inspection method(s), and velocity. Apply the couplant to the applicable points on the calibration standard. The 5%T notch on a 1" thick plate should be used to obtain the reference level.

7.5.2 Manipulate the transducer to receive the maximum response from the reference notch. Adjust the gain control to produce a reflection of 80% full screen height (FSH). Input this value as the reference level. Obtain a response from the calibration reflector and verify that the response is within +/- 2dB.

7.5.3 Position the transducer to produce a response from the reference reflector. Using the scan menu, collect data from that notch. The transducer may be removed from the scanner and remain stationary "static" while the scanner is manipulated to make an indication on the screen.

7.5.4 Use the level control to determine the peak amplitude and the position of the indication at the peak amplitude. Use index delay and velocity (if required) to adjust the system to plot the reflectors in the appropriate positions. The ID notch should plot on the ID at or near the peak amplitude.

7.5.5 Repeat steps 7.5.2 through 7.5.3 as required for each transducer until the system is calibrated.

7.5.6 The vital parameters used for the calibration shall be identical to the inspection parameters with the exceptions of file name(s), X, Y and Z ranges, reference level compensations, thickness, gates or comment parameters which may be adjusted as required.

7.5.7 The calibration reflector(s) and response shall be recorded for each applicable transducer on the Automated Ultrasonic P-Scan Calibration Sheet (Attachment 7).

7.6 Sizing Calibration for Tip Diffraction Techniques (AATT, RATT)

a) Select an appropriate transducer.

b) Select a sizing calibration block of similar thickness and material containing at least two notches of known depths.

c) For the AATT technique, set at least two gates, to cover the entire area of interest. The first gate in the first leg, ending just before the ID. Position the transducer on the calibration block. Alternately peak the shallow and deep signals from the notch tips (see Attachment 6). Using the index delay and velocity controls, adjust the system until the system correctly reads the remaining ligament with the "Z" cursor.

d) For the RATT technique, the system mode should be set to A-SCAN. Manipulate the transducer until signals are obtained from the shallow notch tip and the notch base simultaneously (see Figure 2, Attachment 6). Using the index delay and velocity, adjust the distance between the two signals to read the actual reflector depth in inches. Repeat the same process on the deep

notch. Alternate this procedure until the screen/system represents a desirable linear depth screen in inches.

e) Save the calibration, and record this data on the Automated Ultrasonic P-Scan Calibration Sheet (Attachment 7).

8.0 EXAMINATION

8.1 Surface Condition

8.1.1 The surface from which measurements are to be taken should be free of loose scale, unbonded coating, heavy oxidation, weld spatter, or other material which may interfere with movement of the transducer or the transmission of sound into the material.

8.1.2 A surface finish of 250 RMS or better should be provided. The requesting organization must approve the use of any base material preparation process, which may reduce the thickness below the allowable tolerance.

8.2 Extent of Examination

The location of the areas to be measured and/or the number of scans to be performed shall be designated by the applicable work instructions. The location, scan numbers, and reference points of all scans shall be recorded on the applicable data sheets. See attachment 1 for minimum examination volume and beam direction for weld inspection.

NOTE: Additional scan areas will not require revision to this procedure.

8.3 Flaw Location

When performing examinations to detect planar flaws, angle beam transducers shall be used. Calibration is performed as in Section 7.5. All angle beam examinations shall be performed in P-scan.

8.4 Ultrasonic Measurement

User calibration shall have been completed per the applicable requirements of Section 7.0 prior to performing any of the examinations.

8.4.1 The amplitude of the first back reflection obtained from the item to be examined shall be adjusted as necessary using the Transfer Correction to

maintain approximately the same amplitude as that used for calibration. The dB value obtained with straight beam transducer should be recorded on the report. This value should be considered during analysis of P-scan angle beam data also.

8.4.2 Transducer overlap between passes shall be a minimum of 50% of the element size. Scanning speed shall not exceed 6 inches per second.

8.4.3 Should measurements be observed larger or smaller than the range calibrated for in Section 6.0, check the calibration for accuracy in the encountered thickness range. If the calibration is accurate in this range, amend the calibration sheet and continue the examination. If the calibration is not within the tolerance allowed in the spec, then recalibrate and rescan all areas where readings were encountered outside the originally calibrated range.

8.5 Limitations and Precautions

8.5.1 Care must be taken to ensure the transducer face is flush with the examination surface during scanning.

8.5.2 When it is necessary to determine the origin of mid-wall indications, a 4MHz shear wave transducer(s) may be used in the P-Scan program to detect pit openings or perpendicular connections between laminar indications.

8.6 Recording

Upon completion of each scan area, the data file(s) shall be recorded on a disk. All measurements within the predetermined gated area are stored, along with the text information with each file.

8.7 General Sizing Guidelines

8.7.1 It is recognized that, of the methods of sizing described in this procedure, no one technique is completely accurate in sizing all flaws in all thicknesses. By using complementary methods, however, a realistic approximation of the flaw depth can be obtained.

8.7.2 The method of sizing pits is primarily utilizing a zero degree dual element transducer. The 45-degree shear wave transducers may be used to confirm qualitatively the depth of the pit.

8.7.3 When sizing crack-like indications, the entire flawed area shall be scanned with the imaging mode. The entire flaw length shall be evaluated. It is recommended that A-Scans be recorded at the deepest location of the flaw. The primary technique for sizing crack-like indications is the high frequency, 45 degree shear wave transducer utilizing the Absolute Arrival Time Technique (AATT). The dual element, straight beam may be used as a complimentary technique.

8.7.4 Additional sizing technique sequences may be utilized if the primary techniques identified prove to be indeterminable.

8.8 Sizing with Tip Diffraction Techniques (AATT, RATT)

8.8.1 The AATT technique uses shear waves to obtain a diffracted echo (satellite pulse) from the flaw tip (see Figure 1 Attachment 6). The RATT technique uses shear wave reflected signals from both the flaw tip and the flaw base (see Figure 2 Attachment 6). Both techniques can be utilized using the same transducer.

a) AATT Technique

Locate the deepest extremity of the flaw and maximize the signal from the flaw tip. The distance to the flaw tip represents the remaining material ligament from the outside surface. To determine the relative through wall flaw depth, subtract this dimension from the local material wall thickness.

b) RATT Technique

Locate the deepest extremity of the flaw, and obtain a signal from the flaw base. Manipulate the transducer until the doublet (flaw base and tip signal appearing simultaneously) is observed. These signals do not have to be peaked, as the doublet separation directly indicates the relative through wall depth. To determine remaining material ligament, subtract the relative through wall depth measurement from the local material wall thickness.

8.8.2 Other sizing techniques or variations to the techniques may be used with the approval of the UT Level III. Such approval, signature and a

description of the technique shall be recorded in the "Remarks" column on the Ultrasonic Sizing Calibration Sheet (Attachment 7).

9.0 EVALUATION

9.1 Relevant Indications

Relevant indications including pitting, thinning and crack-like indications along with the minimum thickness reading in the area of interest shall be recorded and used for evaluation per Paragraph 9.2.

9.1.1 P-scan data shall be evaluated to a sensitivity of 20% reference level (-14dB). All crack-like indications are recordable regardless of amplitude.

9.1.2 T-scan data shall be evaluated utilizing all available images to detect and evaluate indications.

9.1.3 Reportable indications shall be evaluated by Level III personnel prior to final report submittal.

9.2 Reporting/Special Criteria

Reporting and special notification criteria are noted in Section 9.8.

9.3 Statistical Information

The statistical information (Minimum and Mean thickness) provided under "Setup" pages 1 & 2 of the post-processing software should be reported for each "Part" of a given scan location. Where data noise invalidates these values, the analyst should determine the values using the level control.

9.4 Printouts

Printouts should be made in accordance with the customer's request. In absence of further direction, both the merged set-up pages and the merged image, adjusted to show the minimum thickness, shall be printed at a level that best shows the wear patterns or at Nominal T - 12.5%, whichever provides the most useful information. P-scan data should be printed with the level control set at 20% reference level (-14dB).

9.5 Recording Crack Size

9.5.1 All flaw sizing data acquired should be used to determine the flaw depth. This data shall be reported individually for each flaw and shall include all data necessary to achieve the best accuracy of flaw depth.

9.5.2 If, during sizing, a flaw length other than that reported during the detection examination is measured, or other discrepant conditions occur, record the corrected lengths, locations. or distances on the Ultrasonic P-scan Data Report (Attachment 8) in the spaces provided.

9.5.3 If, during sizing, the area is determined not to be flawed, and the resultant reflector(s) is due to component/weld geometry or metallurgical structure, the true origin (e.g., root, mismatch, etc.) shall be documented and substantiated on the Ultrasonic P-scan Data Report.

9.6 Scanning Limitations

Record all limitations due to weld configurations, obstructions, single side access restrictions, etc., in the remarks section on the applicable Ultrasonic Data Report. Details as to specific length or area in relation to L (X) and/or W (Y) reference points should be recorded.

9.7 Flaw Evaluation

Reportable indications shall be evaluated by Level III personnel prior to final report submittal.

9.8 Reporting Levels

All indications which meet or exceed the following conditions shall be reported to the project cognizant engineer.

a) Pit depth exceeds 25% of the wall thickness.

b) Wall thinning exceeds 10% of the wall thickness.

c) Surface crack depths exceeding 0.18 inches.

10.0 REPORTS

10.1 Thickness Data Reports

An Automated Ultrasonic Thickness Data Report (Attachment 3) shall be prepared for each examination or series of examinations performed. This report shall include identity of equipment, the thickness measurements obtained, and should be referenced to the calibration sheet.

10.2 Calibration Reports

An Automated Ultrasonic Examination Calibration Sheet (Attachment 4) shall be prepared for each examination or series of examinations performed. This report shall include the materials and equipment used for examination.

10.3 Sketch Sheets

An Automated Ultrasonic Examination Sketch Sheet (Attachment 5) should be prepared for each examination or series of examinations performed. This report should include identity of scanning equipment and a sketch of the component or item examined, identifying scan locations, including dimensions, reference points, and grid locations, where applicable.

10.4 Sizing Data Reports

An Ultrasonic Sizing Data Report (Attachment 8) shall be completed only when cracking is detected. Each report shall be related to the applicable Automated Ultrasonic Examination Calibration Sheet(s).

10.5 Cover Sheets

Whenever several locations are being examined on the same conponent an Automated Ultrasonic Examination Report Cover Sheet (Attachment 1) and an Automated Ultrasonic Thickness Report Summary Sheet (Attachment 2) should be completed.

10.6 Final Reports

Final reports are to be distributed and maintained in accordance with the applicable contract.

11.0 ATTACHMENTS

11.1 Attachment 1: Examination Volume, Minimum Beam Directions and Extent of Examination

11.2 Attachment 2: Sample Automated Ultrasonic Thickness Data Report

11.3 Attachment 3: Sample Automated Ultrasonic Thickness Calibration Sheet

11.4 Attachment 4: Figure 1: Absolute Arrival Time Technique (AATT)
Figure 2: Relative Arrival Time Technique (RATT).

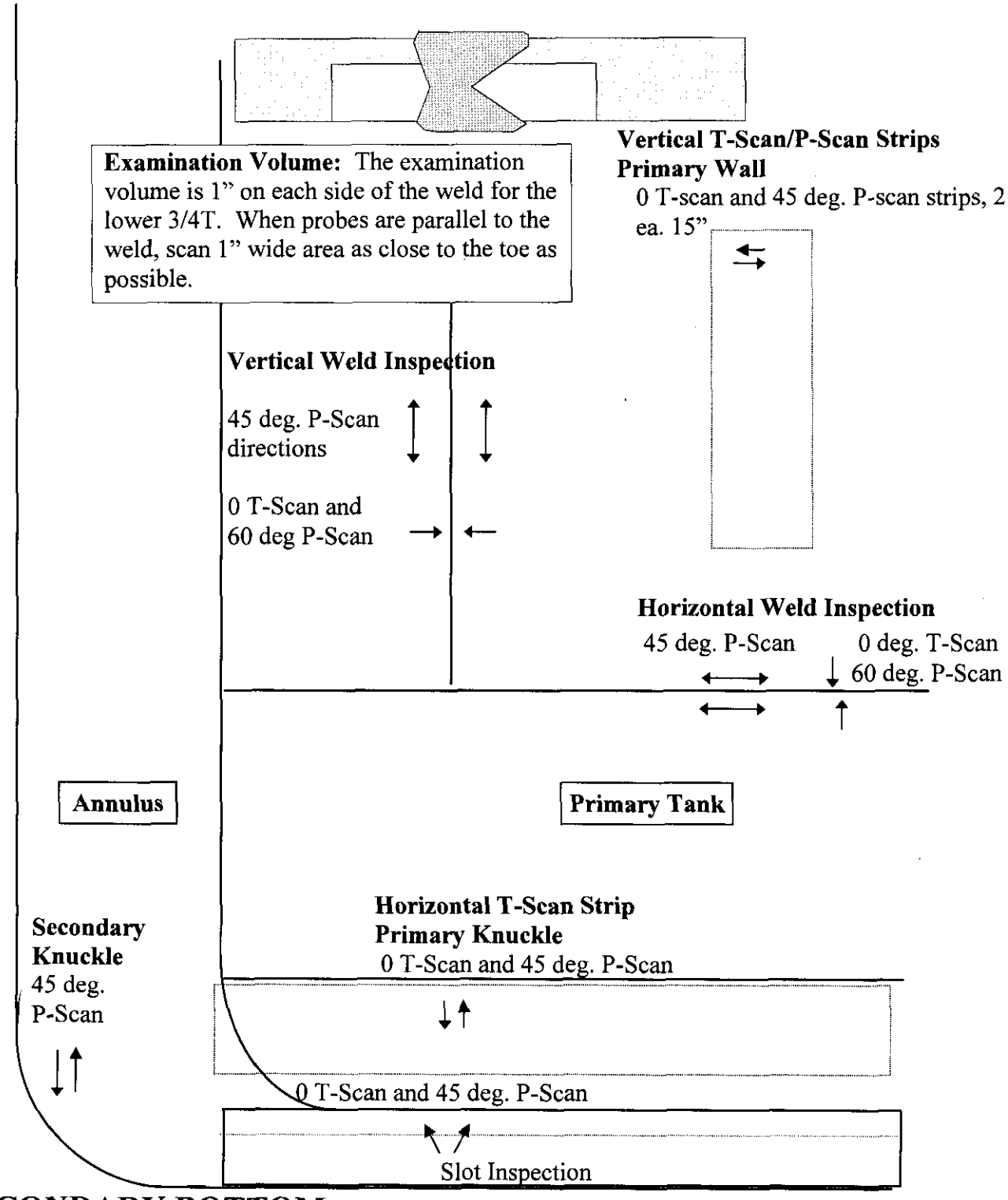
11.5 Attachment 5: Sample P-scan Calibration Data Sheet

11.6 Attachment 6: Sample Ultrasonic P-scan Data Report

COGEMA ENGINEERING CORP.

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 1: Examination Volume, Minimum Beam Directions and Extent of Examination



Attachment 1 (continued): Extent of Examination

Primary Tank Wall

Vertical Strips - Examine a vertical strip 30" x 35 feet long of the primary wall between the upper haunch transition and the lower knuckle for pits, cracks and wall thinning. Axial cracks on the tank inner wall surface shall be detected and sized. The vertical strip may be comprised of one or more strips whose total width is equal to 30 inches.

Weld Areas - Examine 20 feet of horizontal weld area (heat affected zone), at tank to knuckle weld. Examine one ~10 foot section of vertical weld joining the lowest shell course plates and one ~10 foot section of vertical weld joining the next to lowest shell course plates. Axial and circumferential cracks on the tank inner surface shall be detected and sized.

Primary Tank Knuckle

Examine 20 feet of the primary tank lower knuckle in the circumferential direction to detect and size cracking in the circumferential direction and to detect pits and wall thinning. The area to be examined is from the weld joining the transition plate with the knuckle to the furthest reach of the transducer assembly that is allowed by geometric constraints.

Secondary Tank

Secondary Tank Lower Knuckle – Examine a 20 foot length of the secondary tank knuckle over the entire area of the knuckle for the presence of circumferential cracks.

Secondary Tank Bottom – Examine the secondary tank bottom over an area of 10 ft^2 to detect and measure thickness and pits.

Primary Tank Bottom

Examine the primary tank bottom for pits, wall thinning and cracks oriented in the circumferential direction (perpendicular to the air channels) in 16 air channels. The tank bottom is to be examined for a distance of 12 feet towards the tank center, starting seven inches inboard of the outside radius of the tank cylindrical section. The primary tank bottom scan head is designed to examine the accessible area in the air channel in one pass through the channel.

COGEMA ENGINEERING CORP.

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 2: Sample Automated Ultrasonic Thickness Data Report

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

LOCATION	SYSTEM	EXAM START	EXAM END	JOB #
COMPONENT ID		EXAMINATION SURFACE ☐ OD ☐ ID ☐ PAINTED		NOM. THICKNESS
CONFIGURATION TO		CALIBRATED RANGE		TEMP °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED		REF. LEVEL CORRECTION (TRANS. CORR) _____ DB		
PROCEDURE	REV	MATERIAL TYPE ☐ SS ☐ CS OTHER _____		CONDITION
FILE NAME/ITEM#		TRANSDUCER ☐ DUAL ☐ SGL ☐ 0DEG ☐ ANGLE ____		
X_o REF. POINT (L_o)	Y_o REF. POINT (W_o)	SCAN WIDTH		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	COMMENTS
SUMMARY								

REMARKS _____

Examiner	Analyst	Reviewer	Page
_____	_____	_____	
Level ___ Date_____	Level ___ Date_____	Level ___ Date_____	___ of ___

COGEMA ENGINEERING CORP.

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 3: Sample Automated Ultrasonic Thickness Calibration Sheet

4/00	**AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET**	

LOCATION		SYSTEM			CALIBRATION BLOCK				
PROCEDURE					THICKNESS			MATERIAL	
UT SYSTEM		SERIAL #			REFERENCE BLOCK				
SOFTWARE VERSION		REV.			THICKNESS			MATERIAL	
LINEARITY DUE DATE					REFERENCE BLOCK TEMP °F			PYRO SN.	
SCANNER TYPE		SERIAL #			COUPLANT			BATCH #	
SCANNER CABLE					CABLE LENGTH		CABLE #		
SIGNAL CABLE					CABLE LENGTH		CABLE #		

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ.	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE
1									
2									
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS								
DATE										
TIME										
REFLECTOR										
CH. 1	THK.1									
	THK. 2									
CH. 2	THK.1									
	THK. 2									
CH. 3	THK.1									
	THK. 2									
CH. 4	THK.1									
	THK. 2									
FILE #										
EXAMINER										

REMARKS_____

Examiner	Examiner	Reviewer	
_____	_____	_____	
LEVEL ___ DATE_____	Level ___ Date_____	Level ___ Date_____	

Attachment 4: Absolute Arrival Time Technique (AATT) & Relative Arrival Time Technique (RATT)

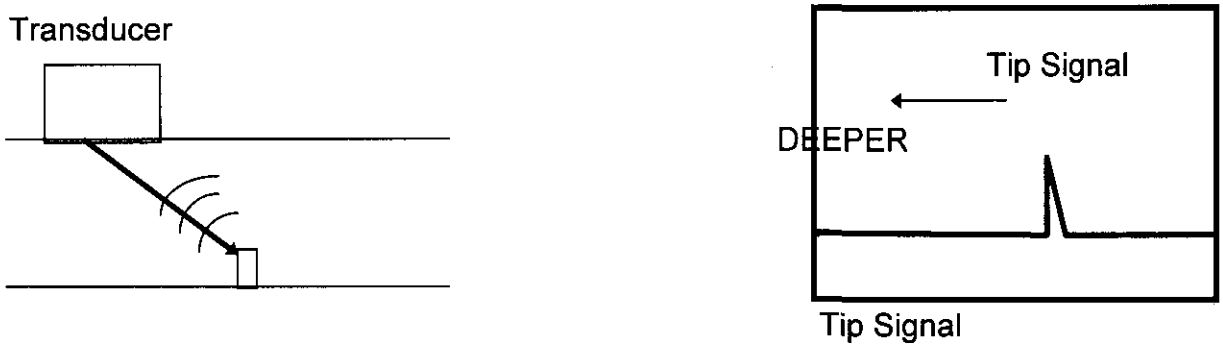


Figure 1. Absolute Arrival Time Technique

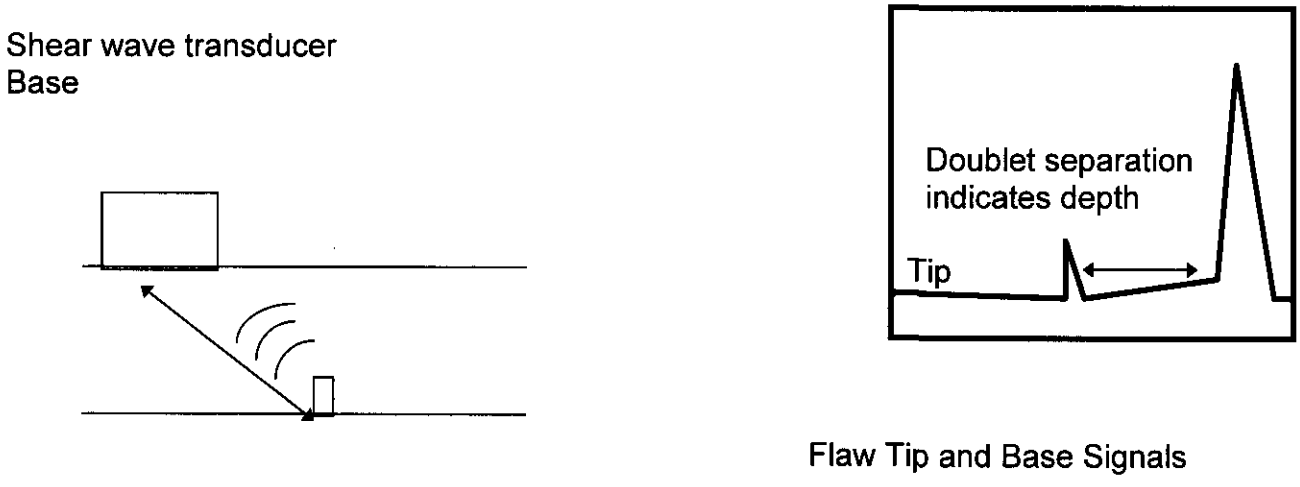


Figure 2. Relative Arrival Time Technique

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AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 5: Sample P-scan Calibration Sheet

4/00	**AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET**	

LOCATION	SYSTEM	CALIBRATION BLOCK	
PROCEDURE		THICKNESS	MATERIAL
UT SYSTEM	SERIAL #	REFERENCE BLOCK	
SOFTWARE VERSION	REV.	THICKNESS	MATERIAL
LINEARITY DUE DATE		REFERENCE BLOCK TEMP °F	PYRO SN.
SCANNER TYPE	SERIAL #	COUPLANT	BATCH #
SCANNER CABLE		CABLE LENGTH	CABLE #
SIGNAL CABLE		CABLE LENGTH	CABLE #

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ.	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM./ACT.	WEDGE TYPE	IMAGE
1									
2									
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE									
TIME									
REFLECTOR / ORRIENTATION									
CH. 1	AMPLITUDE								
	LOCATION								
CH. 2	AMPLITUDE								
	LOCATION								
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS _____

Examiner	Examiner	Reviewer	Page
_____	_____	_____	___ of ___
Level ___ Date_____	Level ___ Date_____	Level ___ Date_____	

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COGEMA-SVUT-INS-007.3, Rev. 1
UNCONTROLLED COPY

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 6: Sample P-scan Data Report

4/00	**ULTRASONIC P-SCAN DATA REPORT**		
LOCATION	SYSTEM	EXAM START / EXAM END	JOB #
COMPONENT ID		EXAMINATION SURFACE ☐ OD ☐ ID ☐ PAINTED	CONDITION
CONFIGURATION	TO	CALIBRATED RANGE	TEMP °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED		REF. LEVEL CORRECTION (TRANS. CORR) _____ DB	
PROCEDURE	REV	MATERIAL TYPE ☐ SS ☐ CS OTHER _____	
FILE NAME/ITEM#		TRANSDUCER ☐ DUAL ☐ SGL ☐ 0DEG ☐ ANGLE ____	
X_o REF. POINT (L_o)	Y_o REF. POINT (W_o)	SCAN WIDTH	

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

Examiner	Analyst	Reviewer	Page
Level ___ Date_____	Level ___ Date_____	Level ___ Date_____	___ of ___

ATTACHMENT 2

COGEMA "AUTOMATED ULTRASONIC THICKNESS DATA REPORT SHEETS"

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ATTACHMENT 2

COGEMA "AUTOMATED ULTRASONIC THICKNESS DATA REPORT SHEETS"

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/19/03 0845	EXAM END: 2030	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.4		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: VERT. WALL / PLATE 1		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_0 REF. POINT (L_0): 1" below HORZ weld	Y_0 REF. POINT (W_0): CL of marker #1 HORZ. weld North of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.515"	.480"		.535"
12-24					.515"	.479"		.530"
24-36					.517"	.496"		.530"
36-48					.517"	.499"		.530"
48-60					.517"	.497"		.530"
60-72					.516"	.497"		.530"
72-84					.515"	.494"		.530"
84-89.4					.511"	.499"		.530"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W.D Purdy	[signature]	(N1)	
Level II Date 3/19/03	Level III Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) See Attached Letter From J. B Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/19/03 0800	EXAM END: 2033	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.5"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVUT-SNS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK .500"		
FILE NAME/ITEM#: VERT. WALL/PLATE 1		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (L_o): 1" below Horz Weld.	Y_o REF. POINT (W_o): ℄ of marker 21 Horz weld North of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W.D Purdy	[signature]	(N1)	
Level II Date 3/19/03	Level III Date 5/6/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/20/03 0715	EXAM END: 1415	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.5"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: VERT. WALL / PLATE 2		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_o REF. POINT (Lo): 1" below Horz weld	Y_o REF. POINT (Wo): ℄ of make 21 Horz weld north of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.515"	.485"		.535"
12-24					.505"	.484"		.530"
24-36					.505"	.504"		.530"
36-48					.509"	.496"		.530"
48-60					.506"	.492"		.530"
60-72					.509"	.495"		.530"
72-84					.505"	.499"		.530"
84-89.5					.499	.489"		.625"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy		(NI)	
Level II Date 3/20/03	Level III Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(NI) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/20/03 0725	EXAM END: 1418	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.6"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVHT-SNS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK .500"		
FILE NAME/ITEM#: VERT WALL / PLATE 2		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (L_o)	Y_o REF. POINT (W_o)	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W.T. Purdy	Wesley A. Rue	(N1)	
Level II Date 3/20/03	Level II Date 5/6/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/25/03 0720	EXAM END: 1510	JOB #: 03-41	
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .5625"	
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F	
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.6"		REF. LEVEL CORRECTION (TRANS. CORR): ☒ DB			
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION	
FILE NAME/ITEM#: VERT. WALL / PLATE 3		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____			
X_o REF. POINT (L_o): 1" below Horz Weld	Y_o REF. POINT (W_o): ℄ of marker 7 Horz weld North of 24" Riser	SCAN WIDTH: 15"			

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.568"	.563"		.575"
12-24					.568"	.563"		.575"
24-36					.570"	.564"		.575"
36-48					.572"	.566"		.580"
48-60					.574"	.568"		.580"
60-72					.572"	.568"		.580"
72-84					.571"	.558"		.585"
84-89.6					.570"	.554"		.580"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W. D Purdy		(W1)	
Level II Date 3/25/03	Level WS Date 4/7/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(W1) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/25/03 0730	EXAM END: 1515	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: Plate TO		CALIBRATED RANGE: 0" TO 1.59"		TEMP: Amb °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.8"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER: Nom. THK .5625"		
FILE NAME/ITEM#: Vert. Wall \ Plate 3		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (Lo): 1" below Horz. Weld.	Y_o REF. POINT (Wo): ℄ of marker 7 Horz weld North of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO Crack Like Indications.

Examiner	Analyst	Reviewer	Page
W.D Purdy		(NT)	
Level II Date 3/25/03	Level WS Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(NT) See Attached Letter From J. B. Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST Tank Farm	SYSTEM: PSR-4	EXAM START: 3/24/03 0855	EXAM END: 1925	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .750"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 105.2"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVHT-ENS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: VERT. WALL / PLATE 4		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_o REF. POINT (L_o): 1" below Horz. Weld	Y_o REF. POINT (W_o): @ of marker 33 Horz. Weld North of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.755"	.744"		.770"
12-24					.755"	.749"		.770"
24-36					.755"	.749"		.770"
36-48					.757"	.750"		.770"
48-60					.756"	.749"		.765"
60-72					.755"	.750"		.765"
72-84					.754"	.748"		.765"
84-96					.751"	.744"		.765"
96-105.2					.750"	.724"		.760"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W. D Rudd	[signature]	(N1)	
Level II Date 3/24/03	Level ~~III~~ Date 4/13/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 8/24/03 0905	EXAM END: 1930	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: 0" TO 2.12"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 105.4"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TNK .750"		
FILE NAME/ITEM#: VERT. WALL/PLATE 4		TRANSDUCER: ☐ DUAL ☑ SGL ☐ 0DEG ☑ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ 9 & marker 33 Horz Weld North of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley D Ness	(N1)	___ of ___
Level II Date 8/24/03	Level III Date 4/13/03	Level ___ Date ___	
P-Scan Limited.			

(N1) See Attached Letter From J. B. Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/19/03 0845	EXAM END: 2030	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 20.8"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: VERT. WALL / PLATE 5		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_o REF. POINT (L_o): 1" below Horz. Weld	Y_o REF. POINT (W_o): ℄ of marker 30 Horz. Weld North of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.866"	.861"		.880"
12-20.8					.865"	.856"		.880"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W Dowdy		(N1)	
Level II Date 3/19/03	Level III Date 4/15/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) See Attached Letter From J.B Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/19/03 0900	EXAM END: 2033	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO:	CALIBRATED RANGE: 0" TO 2.5"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 20.9"		REF. LEVEL CORRECTION (TRANS. CORR): 9 DB		
PROCEDURE: GGEMA-SV4T-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .875"		
FILE NAME/ITEM#: VERT. WALL/PLATE 5		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (L_o): 1" below Horz Weld	Y_o REF. POINT (W_o): ℄ of marker 30 Horz weld North of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W.D. Purdy	Wesley B. Nelson	(N1)	___ of ___
Level II Date 3/19/03	Level III Date 4/15/03	Level ___ Date ___	
P-Scan United			

(N1) see Attached Letter From J. B. Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/26/03 0740	EXAM END: 2050	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☐ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: Plate	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 84.6"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-ENS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: Vert. Wall / 2nd / Plate 1		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_o REF. POINT (L_o): 1" below Horz weld	Y_o REF. POINT (W_o): ℄ of marker 17 Horz weld south of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.515"	.491"		.535"
12-24					.517"	.508"		.535"
24-36					.517"	.497"		.530"
36-48					.518"	.497"		.530"
48-60					.518"	.501"		.530"
60-72					.518"	.507"		.530"
72-84					.517"	.506"		.530"
84-84.6					.512"	.497"		.525"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
Level III Date 3/26/03	Level III Date 4/15/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/26/03 0745	EXAM END: 2055	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 84.9"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVUT-IND-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .500"		
FILE NAME/ITEM#: VERT. WALL/2ND PLATE 1		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz weld	Y_0 REF. POINT (W_0): ℄ of marker 17 Horz Weld South of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
Level III Date 3/26/03	Level III Date 5/6/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/24/03 0740	EXAM END: 2050	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☐ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: Plate TO		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.7"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: Vert. Wall 1 2nd / Plate 3		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_o REF. POINT (L_o): 1" below Horz Weld	Y_o REF. POINT (W_o): ℄ of marker 17 Horz weld South of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.514"	.491"		.530"
12-24					.515"	.491"		.525"
24-36					.516"	.511"		.525"
36-48					.516"	.508"		.525"
48-60					.516"	.505"		.525"
60-72					.515"	.502"		.520"
72-84					.513"	.506"		.520"
84-89.7					.509"	.489"		.520"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
Level III Date 3/24/03	Level III Date 4/15/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/26/03 0740	EXAM END: 2050	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.6"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-SNS-0007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .500"		
FILE NAME/ITEM#: VERT. WELD 2ND PLATE 2		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (Lo): 1" below Horz. Weld	Y_o REF. POINT (W_o): @ 0° marker 17 Horz Weld South of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
Level III Date 3/26/03	Level II Date 5/6/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/1/03 0730	EXAM END: 1410	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .5625"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 90"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: VERT. WALL\2ND/PLATE3		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_R REF. POINT (L_0): 1" below HORZ Weld	Y_0 REF. POINT (W_0): ℄ of marker 3 Horz. Weld South of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0 - 12					.572"	.568"		.580"
12 - 24					.575"	.571"		.580"
24 - 36					.578"	.573"		.580"
36 - 48					.579"	.577"		.585"
48 - 60					.579"	.576"		.585"
60 - 72					.578"	.569"		.585"
72 - 84					.584"	.574"		.590"
84 - 90"					.586"	.580"		.590"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W.D Purdy	[signature]	(NI)	
Level II Date 4/1/03	Level II Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(NI) See Attached Letter From J.B Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/1/03 0735	EXAM END: 1412	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: 0" TO 1.59"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 90"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER: MAT'L THK. .5625"		
FILE NAME/ITEM#: VERT. WALL/2ND/PLATE 3		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (L_o): 1" below Horz. Weld	Y_o REF. POINT (W_o): ℄ of marker 5 Horz weld south of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: No Crack Like Indications.

Examiner	Analyst	Reviewer	Page
W.D. Rudy	[signature]	(N1)	___ of ___
Level II Date 4/1/03	Level ~~II~~ Date 4/7/03	Level ___ Date ___	
P-Scan Limited			

(N1) See Attached Letter From J. B. Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/31/03 0900	EXAM END: 1940	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .750"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 105.3"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SYUT-IWS-00713	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: VERT WALL/2ND/PLATE4		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (Lo): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ of marker 29 Horz Weld South of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.764"	.754"		.775"
12-24					.766"	.762"		.775"
24-36					.767"	.763"		.775"
36-48					.767"	.763"		.775"
48-60					.767"	.762"		.775"
60-72					.768"	.763"		.775"
72-84					.766"	.759"		.775"
84-96					.763"	.756"		.770"
96-105.3					.762"	.746"		.770"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W.D Rudd	Wesley D Rekar	(WI)	
Level II Date 3/13/03	Level III Date 4/13/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(WI) See Attached Letter From J.B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/31/03 0910	EXAM END: 1945	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: 0" TO 2.12"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 105.3"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-ENS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TNK. .750"		
FILE NAME/ITEM#: VERT. WALL / 2ND / PLATE 4		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (L_o): 1" below HORZ weld	Y_o REF. POINT (W_o): ℄ of marker 29 HORZ weld South of 24" riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 3/31/03	Level III Date 4/13/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) See Attached Letter From J. B. Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/31/03 0900	EXAM END: 1940	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 21.6"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-SWS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: VERT. WALL/2ND/PLATE 5		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_0 REF. POINT (Lo): 1" below Horz. Weld	Y_0 REF. POINT (W_0): ℄ of marker 26 Horz. Weld South of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.879"	.874"		.885"
12-21.6					.877"	.869"		.885"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
WD Purdy		(N1)	
Level II Date 3/31/03	Level III Date 4/15/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/31/03 0910	EXAM END: 1945	JOB #: 03-41
COMPONENT ID: LOS-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO		CALIBRATED RANGE: 0" TO 2.5"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 247"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: CoGEmA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TNK. 875'		
FILE NAME/ITEM#: VERT WALL/2ND/PLATE 5		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (Lo): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ of marker 26 Horz Weld South of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W. D Purdy	Wesley D Elder	(W1)	___ of ___
Level II Date 3/31/03	Level XX Date 4/15/03	Level ___ Date ___	
P-Scan Limited.			

(W1) See Attached Letter From J. B Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/2/03 0815	EXAM END: 2210	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: LIQUID AIR INTERFACE		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_o REF. POINT (Lo): South of 24" Riser @ marker 2 Horz weld	Y_o REF. POINT (Wo): 6" below Horz weld Neg Side of Scan	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.515"	.497"		.525"
12-24					.515"	.485"		.525"
24-36					.515"	.502"		.525"
36-48					.515"	.509"		.525"
48-60					.515"	.509"		.525"
60-72					.515"	.493"		.525"
72-84					.512"	.499"		.520"
84-96					.511"	.494"		.520"
96-108					.513"	.483"		.520"
108-120					.510"	.486"		.520"
SUMMARY								

REMARKS

TOP OF PLATE 2

Examiner	Analyst	Reviewer	Page
W. D Purdy	Wiaby D Mc	(N1)	
Level II Date 4/2/03	Level II Date 4/17/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J B ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/2/03 0825	EXAM END: 2217	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO		CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-INS-00713	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .500"		
FILE NAME/ITEM#: LIQUID AIR INTERFACE		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (L_o): South of 24" Riser @ marker 2 Horz weld	Y_o REF. POINT (W_o): 5" below Horz weld Neg. side of Scan.	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	N1	
Level II Date 4/2/03 P-Scan Limited	Level III Date 5/6/03	Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/2/03 0815	EXAM END: 2210	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): Δ DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: LSQUIRO AIR INTERFACE / A		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_o REF. POINT (Lo): South of 24" Liger @ marker 2 Horz weld	Y_o REF. POINT (Wo): 5" below Horz weld, Neg Side of Scan.	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.509"	.483"		.520"
12-24					.506"	.480"		.520"
24-36					.505"	.480"		.520"
36-48					.502"	.480"		.515"
48-60					.505"	.473"		.525"
60-72					.514"	.488"		.525"
72-84					.518"	.487"		.525"
84-96					.517"	.487"		.525"
96-108					.517"	.486"		.525"
108-120					.517"	.494"		.525"
SUMMARY								

REMARKS

TOP OF PLATE 2

Started @ End of Filo Liq Air Interface.

Examiner	Analyst	Reviewer	Page
W. D Purdy	[signature]	(N1)	
Level II Date 4/2/03	Level ~~II~~ Date 4/17/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J B ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/3/03 0825	EXAM END: 2217	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-0007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK .500"		
FILE NAME/ITEM#: LIQUID AIR INTERFACE A		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45		
X_o REF. POINT (L_o): South of 24" Riser @ marker 2 Horiz weld	Y_o REF. POINT (W_o): 5" below Horiz weld Neg. Side of Scan	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS
NO CRACK LIKE INDICATIONS
Started @ END of File: Liq. Air Interface

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	N1	
Level II Date 4/2/03 P-Scan Limited	Level II Date 5/6/03	Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/3/03 @ 0755	EXAM END: 1430	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☐ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: Amb. °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.1"		REF. LEVEL CORRECTION (TRANS. CORR): 6 DB		
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: VERT. WELD / PLATE 2		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_o REF. POINT (Lo): 1" below Horz Weld	Y_o REF. POINT (W_o): ℄ of Vert. Weld	SCAN WIDTH: 9.2"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0 - 12					.515"	.470"		.520"
12 - 24					.515"	.502"		.520"
24 - 36					.517"	.500"		.520"
36 - 48					.517"	.505"		.525"
48 - 60					.517"	.500"		.525"
60 - 72					.517"	.510"		.525"
72 - 84					.515"	.504"		.520"
84 - 89.1					.512"	.497"		.520"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley D Rev	(NI)	
Level II Date 4/3/03	Level II Date 4/15/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(NI) See Attached Letter From J. B Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/3/03 0805	EXAM END: 1445	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 2.00"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 86.4"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVUT-ENG-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .500"		
FILE NAME/ITEM#: VERT. WELD / PLATE 2		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60		
X_0 REF. POINT (Lo): 1" below Horz weld	Y_0 REF. POINT (Wo): ℄ of Vert. Weld	SCAN WIDTH: 8.7"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy		N1	
Level II Date 4/3/03	Level III Date 5/6/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/14/03 0820	EXAM END: 1935	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.9"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGRMA-SVUT-SNS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER: THK .500"		
FILE NAME/ITEM#: VERT. WELD/45/PLATE 2		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45		
X_0 REF. POINT (Lo): 1" below Horz Weld	Y_0 REF. POINT (Wo): ℄ of Vert. Weld	SCAN WIDTH: 7.7"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Rudd	Wesley H Nelson	N1	___ of ___
Level II Date 4/14/03 P-Scan Limited.	Level III Date 5/6/03	Level ___ Date ___	

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/8/03 0713	EXAM END: 1410	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .5625"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 90.2"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION:
FILE NAME/ITEM#: VERT. WELD 1 PLATE 3		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_o REF. POINT (Lo): 1" below Horz Weld	Y_o REF. POINT (W_o): 0 of Vert. Weld.	SCAN WIDTH: 9.5"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.560"	.547"		.575"
12-24					.565"	.556"		.575"
24-36					.570"	.557"		.575"
36-48					.570"	.547"		.575"
48-60					.570"	.553"		.580"
60-72					.570"	.564"		.580"
72-84					.570"	.552"		.580"
84-90.2					.572"	.565"		.580"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley D Rue	(N1)	
Level II Date 4/8/03	Level III Date 5/5/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/8/03 0730	EXAM END: 1445	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 2.25"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 87.9"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-SNS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .5625"		
FILE NAME/ITEM#: VERT. WELD / PLATE 3		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60		
X_0 REF. POINT (L_0): 1" below Horz weld	Y_0 REF. POINT (W_0): ℄ of Vert. Weld	SCAN WIDTH: 9.0"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley J Nelson	N1	
Level II Date 4/8/03	Level III Date 5/5/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/14/03 0820	EXAM END: 1935	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 1.59"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.7"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVUT-ENG-007,3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .5625"		
FILE NAME/ITEM#: VERT. WELD/45/PLATE 3		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45		
X_o REF. POINT (L_o): 1" below Horz Weld	Y_o REF. POINT (W_o): ℄ of Vert Weld	SCAN WIDTH: 7.9"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	N1	
Level II Date 4/14/03	Level III Date 5/6/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/9/03 0700	EXAM END: 1400	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .750"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 104.2"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-ENS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: VERT. WELD | PLATE 4		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_o REF. POINT (L_o): 1" below Horz Weld.	Y_o REF. POINT (W_o): ℄ of Vert. Weld.	SCAN WIDTH: 9.3"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.765"	.738"		.780"
12-24					.760"	.740"		.780"
24-36					.760"	.730"		.780"
36-48					.765"	.734"		.775"
48-60					.765"	.728"		.775"
60-72					.760"	.727"		.775"
72-84					.760"	.736"		.775"
84-96					.760"	.717"		.775"
96-104.2					.760"	.721"		.775"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Rudd	Wesley A Nuss	(N1)	
Level II Date 4/9/03. P-Scan Limited.	Level III Date 5/5/03	Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/9/03 0722	EXAM END: 1407	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 3.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 102.2"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-ENG-007,3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .750"		
FILE NAME/ITEM#: VERT. WELD / PLATE 4		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60		
X_0 REF. POINT (L_0): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ of Vert Weld	SCAN WIDTH: 8.5"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 4/09/03	Level III Date 5/5/03	Level ___ Date ___	___ of ___
P-Scan limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/14/03 0820	EXAM END: 1935	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO: PLATE	CALIBRATED RANGE: 0" TO 2.12"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 104.8"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVUT-ENG-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .750"		
FILE NAME/ITEM#: VERT. WELD/45/PLATE 4		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (L_o)	Y_o REF. POINT (W_o)	SCAN WIDTH: 7.7"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
WDPowell	Wesley D Neu	(N1)	
Level II Date 4/14/03	Level III Date 5/6/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 0700 4/9/03 / EXAM END: 1400	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED	NOM. THICKNESS: .875"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"	TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 20.3"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB	
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____	CONDITION:
FILE NAME/ITEM#: VERT. WELD / PLATE 5		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____	
X_0 REF. POINT (L_0): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ of Vert. Weld	SCAN WIDTH: 9.3"	

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.870"	.846"		.890"
12-20.3					.870"	.843"		.890"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley S Rose	(N1)	
Level II Date 4/9/03	Level III Date 5/5/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/9/03 0722	EXAM END: 1407	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 3.5"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 18.6"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-SNS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .875"		
FILE NAME/ITEM#: VERT. WELD / PLATE 5		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60		
X_R REF. POINT (L_O): 1" below Horz Weld	Y_R REF. POINT (W_O): ℄ of Vert. Weld	SCAN WIDTH: 8.4"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Rudy	Wesley A Nel	N1	___ of ___
Level II Date 4/9/03 P-Scan Limited	Level III Date 5/5/03	Level ___ Date ___	

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/14/03 0820	EXAM END: 1935	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 2.5"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 20.6"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-IND-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ___ THK .875"		
FILE NAME/ITEM#: VERT. WELD / 45 / PLATE 5		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz weld	Y_0 REF. POINT (W_0): Ctr of Vert Weld	SCAN WIDTH: 8"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley H Nelson	(N1)	
Level II Date 4/14/03	Level ~~II~~ III Date 5/6/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/7/03 0715	EXAM END: 1545	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 94.3"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_o REF. POINT (L_o): North of 24" Riser 1st slot South of Air Supply	Y_o REF. POINT (W_o): ℄ of HORZ weld.	SCAN WIDTH: 9.2"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.874"	.869"		.880"
12-24					.874"	.869"		.880"
24-36					.875"	.869"		.880"
36-48					.875"	.871"		.880"
48-60					.876"	.863"		.880"
60-72					.876"	.872"		.880"
72-84					.877"	.870"		.880"
84-92.3					.876"	.871"		.880"
SUMMARY								

REMARKS

PLATE SIDE

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley H Neher	(N1)	
Level II Date 4/7/03	Level III Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/7/03 0715	EXAM END: 1545	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .937"
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 94.3"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-SNS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_o REF. POINT (L_o): North of 241 Riser 1st slot south of air line	Y_o REF. POINT (W_o): ℄ of Horz weld.	SCAN WIDTH: 9.2"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.940"	.934"		.945"
12-24					.940"	.929"		.945"
24-36					.940"	.921"		.945"
36-48					.939"	.919"		.945"
48-60					.939"	.925"		.945"
60-72					.939"	.899		.945"
72-84					.940"	.907"		.945"
84-94.3					.940"	.922"		.945"
SUMMARY								

REMARKS: KNUCKLE SIDE

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley D Neel	(N1)	
Level II Date 4/7/03 P-Scan Limited.	Level III Date 5/7/03	Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST FARM	SYSTEM: PSP-4	EXAM START: 4/7/03 0730	EXAM END: 1555	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: 0" TO 3.75"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 94.3"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVUT-INS-0073	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .875" & .937"		
FILE NAME/ITEM#: 14022. WELD / KNUCKLE		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60		
X_0 REF. POINT (L_0) North of 24" Riser 1st Slot south of Air Line	Y_0 REF. POINT (W_0) ℄ of Holz Weld	SCAN WIDTH: 8.6"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy		(N1)	
Level II Date 4/7/03	Level III Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/16/03 0735	EXAM END: 1615	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: 0" TO 2.65"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 105.8"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .875" @ .937"		
FILE NAME/ITEM#: HORZ. WELD / US / KNUCKLE		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 4/5		
X_0 REF. POINT (L_0) North of 24" Riser 1st Slot South of Airline	Y_0 REF. POINT (W_0) ℄ of Horz Weld.	SCAN WIDTH: 7.8"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

STARTED @ FIRST AIR SLOT SOUTH OF NORTH AIRLINE

Examiner	Analyst	Reviewer	Page
W D Rudd	Wesley D Mell	N1	
Level II Date 4/16/03	Level II Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/10/03 0730	EXAM END: 1430	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875" & .937"
CONFIGURATION: PLATE TO KNUCKLES		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 21.4"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE A		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_o REF. POINT (L_o): North of 24" Riser 1st slot south of Air Line	Y_o REF. POINT (W_o): C of Horz weld	SCAN WIDTH: 9.1"		

	PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
PLATE	0-12					.878"	.871"		.882"
	12-21.4					.879"	.875"		.882"
KNUCKLE	0-12					.938"	.913"		.941"
	12-21.4					.939"	.918"		.941"
	SUMMARY								

REMARKS

Started @ vert weld south of North Air Line

Examiner	Analyst	Reviewer	Page
W D Purdy		(N1)	
Level II Date 4/18/03	Level ☒ Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST BARN FARM	SYSTEM: PSP-4	EXAM START: 4/10/03 0743	EXAM END: 1435	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: 0" TO 3.75"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 18.9"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-IND-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK .875" & .937"		
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE A		TRANSDUCER: ☐ DUAL ☒ SGL. ☐ 0DEG ☒ ANGLE 60		
X_0 REF. POINT (L_0) North of 24" Riser 1st slot South of Air Line	Y_0 REF. POINT (W_0) ℄ of Horz Weld.	SCAN WIDTH: 8.2"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

STARTED @ VERT. WELD SOUTH OF NORTH ASR LINE

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley D Neer	(N1)	
Level II Date 4/10/03	Level III Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/16/03 0735	EXAM END: 1515	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: 0" TO 2.65"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-ENG-0073	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .875" & .937"		
FILE NAME/ITEM#: HORZ. WELD/45/KNUCKLE A		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (L_o) North of 24" Riser 1st Slot South of Air Line	Y_o REF. POINT (W_o) C/L of Horz Weld.	SCAN WIDTH: 7.8"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

STARTED @ VERT. WELD KNUCKLE SIDE SOUTH OF NORTH ASELENE

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley Nu	(N1)	
Level II Date 4/16/03	Level II Date 5/7/03	Level ___ Date ___	___ of ___
PScan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/10/03 0730	EXAM END: 1430	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE B		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_o REF. POINT (L_o): North of 24" Riser 1st Slot South of Air Line	Y_o REF. POINT (W_o): ℄ of HORZ Weld	SCAN WIDTH: 9.1"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.890"	.873"		.895"
12-24					.880"	.877"		.895"
24-36					.890"	.894"		.895"
36-48					.890"	.893"		.895"
48-60					.881"	.873"		.895"
60-72					.883"	.876"		.887"
72-84					.885"	.882"		.890"
84-96					.887"	.874"		.890"
96-108					.890"	.878"		.895"
108-120					.891"	.880"		.895"
SUMMARY								

REMARKS

PLATE SIDE

STARTED @ 18.9" OF HORZ. WELD / KNUCKLE A

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 4/10/03	Level III Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/10/03 0730	EXAM END: 1430	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☑ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .937"
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE B		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_o REF. POINT (L_o): South of 24" Riser 1st slot South of Q in Line	Y_o REF. POINT (W_o): ℄ of Horz Weld.	SCAN WIDTH: 9.1"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.938"	.905"		.940"
12-24					.939"	.926"		.940"
24-36					.938"	.929"		.940"
36-48					.940"	.917"		.945"
48-60					.939"	.924"		.945"
60-72					.940"	.924"		.945"
72-84					.945"	.920"		.950"
84-96					.946"	.918"		.955"
96-108					.938"	.901"		.945"
108-120					.938"	.920"		.945"
SUMMARY								

REMARKS

KNUCKLE SIDE

STARTED @ 18.9" OF HORZ. WELD / KNUCKLE A

Examiner	Analyst	Reviewer	Page
W D Rudd		(N1)	
Level II Date 4/10/03	Level III Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST BENCH FARM	SYSTEM: PSP-4	EXAM START: 4/10/03 0743	EXAM END: 1435	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: 0" TO 3.75"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVUT-SNS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .875 & .937"		
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE B		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60		
X_0 REF. POINT (L_0) North of 24" Riser 1st Slot South of Air Line	Y_0 REF. POINT (W_0) ℄ of Horz Weld.	SCAN WIDTH: 8.2"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

STARTED @ 18.9" OF HORZ. WELD / KNUCKLE A

Examiner	Analyst	Reviewer	Page
W D Rudy	[signature]	N1	
Level II Date 4/10/03	Level II Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/16/03 0735	EXAM END: 1515	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: 0" TO 2.65"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 32.3"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVUT-ENG-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK .675" @ 937°		
FILE NAME/ITEM#: HORZ. WELD/45/KNUCKLE B		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_o REF. POINT (Lo) North of 24" Riser 1st slat South of Bar Line	Y_o REF. POINT (W_o) CL of Horz Weld	SCAN WIDTH: 7.8"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

STARTED @ END OF HORZ. WELD/45/ KNUCKLE A

Examiner	Analyst	Reviewer	Page
W D Rudd		N1	
Level II Date 4/16/03	Level II Date 5/7/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT — RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/10/03 0730	EXAM END: 1430	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 38.5"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-ENS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE C		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_o REF. POINT (L_o) North of 24" Riser 1st Slot South of Air Line	Y_o REF. POINT (W_o) CL of Horz Weld	SCAN WIDTH: 9.1"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.890"	.882"		.895"
12-24					.892"	.887"		.895"
24-36					.892"	.890"		.905"
36-38.5					.892"	.889"		.900"
SUMMARY								

REMARKS

Plate side

STARTED @ END OF HORZ. WELD / KNUCKLE B

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 4/10/03	Level III Date 5/7/03	Level ___ Date ___	___ of ___
PaScan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/10/03 0730	EXAM END: 1430	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .937"
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 38.5"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVHT-ENS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE C		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_o REF. POINT (L_o): North of 24" Riser 1st slot South of Air Line	Y_o REF. POINT (W_o): CL of Horz weld	SCAN WIDTH: 9.1"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.936"	.920"		.940"
12-24					.940"	.926"		.950"
24-36					.945"	.929"		.950"
36-38.5					.938"	.919"		.950"
SUMMARY								

REMARKS

Knuckle Side

STARTED @ END OF HORZ. WELD / KNUCKLE B

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 4/10/03	Level II Date 5-7-03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/10/03 0743	EXAM END: 1435	JOB #: 03-41
COMPONENT ID: 105-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: 0" TO 3.75"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 36"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-SNS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .875" & .937"		
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE C		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60		
X_0 REF. POINT (Lo) North of 24" Riser 1st slot South of Air Line	Y_0 REF. POINT (W_0) C/L of HORZ weld	SCAN WIDTH: 8.2"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

STARTED @ END OF HORZ. WELD / KNUCKLE B

Examiner	Analyst	Reviewer	Page
W D Purdy		N1	
Level II Date 4/10/03	Level II Date 5/7/03	Level ___ Date ___	___ of ___
PSCon Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Notch Block 584-99-30-146	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN: N/A
SCANNER TYPE: AWS-5d	SERIAL #;	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM./ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9mm	3127		45		DATA / SIZE / SET
2	KB	MWB	4	8x9 mm	3137		45		
3									
4									

	INITIAL CALIBRATION	CALIBRATION CHECKS							
DATE	3/19/03	3/19/03	3/20/03	3/20/03	3/24/03	3/24/03	3/25/03	3/25/03	
TIME	0900	2033	0725	1418	0905	1930	0730	1515	
REFLECTOR / ORRIENTATION	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	
CH. 1 AMPLITUDE	80%/0dB	80%/2dB	80%/0dB	80%/0dB	80%/0dB	80%/0dB	80%/0dB	80%/1dB	
CH. 1 LOCATION	1.414	1.414	1.414	1.414	1.414	1.411	1.414	1.408	
CH. 2 AMPLITUDE	80%/0dB	80%/-2dB	80%/0dB	80%/1dB	80%/0dB	80%/1dB	80%/0dB	80%/-2dB	
CH. 2 LOCATION	1.414	1.417	1.414	1.417	1.414	1.414	1.414	1.408	
CH. 3 AMPLITUDE									
CH. 3 LOCATION									
CH. 4 AMPLITUDE									
CH. 4 LOCATION									
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
WD Purdy			
Level II Date 3/19-25/03 P-Scan Limited	Level ___ Date ___	Level III Date 5/14/03	___ of ___

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Notch Block	584-99-30-146
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM./ACT.	WEDGE TYPE	IMAGE DATA SET
1	KB	MWB	4	8X9mm	3127		45		SEE
2	KB	MWB	4	8X9mm	3137		45		
3									
4									

		INITIAL CALIBRATION	CALIBRATION CHECKS						
DATE		3/26/03	3/26/03	3/31/03	3/31/03	4/1/03	4/1/03	4/2/03	4/2/03
TIME		0745	2055	0910	1945	0735	1412	0825	2217
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch
CH. 1	AMPLITUDE	80%/0dB	80%/2dB	80%/0dB	80%/2dB	80%/0dB	80%/-1dB	80%/0dB	80%/-1dB
	LOCATION	1.416	1.406	1.414	1.417	1.414	1.414	1.414	1.411
CH. 2	AMPLITUDE	80%/0dB	80%/2dB	80%/0dB	80%/2dB	80%/0dB	80%/1dB	80%/0dB	80%/2dB
	LOCATION	1.416	1.399	1.414	1.420	1.414	1.414	1.414	1.414
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER		WHN	WHN	WDP	WDP	WDP	WDP	WDP	WDP

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy			
Level II Date 3/31-4/2/03	Level III Date 3/26/03	Level III Date 5/6/03	___ of ___
P-Scan Limited			

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Notch Block	584-99-30-146
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SVs 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: AmbºF	PYRO SN: N/A
SCANNER TYPE: AWS-Sd	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM./ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9 mm	3127		45		DATA SET
2	KB	MWB	4	8x9 mm	3137		45		SEE
3	KB	MWB	4	8x9 mm	3024		45		
4	KB	MWB	4	8x9mm	3098		45		

		INITIAL CALIBRATION	CALIBRATION CHECKS						
DATE		4/14/03	4/14/03	4/16/03	4/16/03				
TIME		0820	1935	0735	1515				
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch	.050" Notch	.050" Notch				
CH. 1	AMPLITUDE	80%/0dB	80%/1dB	80%/0dB	80%/0dB				
	LOCATION	1.414	1.411	1.414	1.420				
CH. 2	AMPLITUDE	80%/0dB	80%/-1dB	80%/0dB	80%/2dB				
	LOCATION	1.414	1.408	1.414	1.411				
CH. 3	AMPLITUDE	80%/0dB	80%/-1dB	80%/0dB	80%/0dB				
	LOCATION	1.414	1.414	1.414	1.414				
CH. 4	AMPLITUDE	80%/0dB	80%/0dB	80%/0dB	80%/0dB				
	LOCATION	1.414	1.414	1.414	1.414				
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy			
Level II Date 4/14-16/03	Level ___ Date ___	Level XX Date 5/4/03	___ of ___
P-Scan Limited			

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Notch Block	584-99-30-146
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM./ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9mm	3111		60		DATA / SET / SET
2	KB	MWB	4	8x9mm	3107		60		
3									
4									

		INITIAL CALIBRATION	CALIBRATION CHECKS						
DATE		4/3/03	4/3/03	4/7/03	4/7/03	4/8/03	4/8/03	4/9/03	4/9/03
TIME		0805	1445	0730	1555	0730	1445	0722	1407
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch	.060" Notch	.050" Notch	.060" Notch	.050" Notch	.060" Notch	.060" Notch
CH. 1	AMPLITUDE	80%/0dB	80%/-1dB	80%/0dB	80%/0dB	80%/0dB	80%/0dB	80%/0dB	80%/-1dB
	LOCATION	1.999	1.995	1.999	1.999	1.999	1.999	1.999	1.995
CH. 2	AMPLITUDE	80%/0dB	80%/-1dB	80%/0dB	80%/0dB	80%/0dB	80%/-1dB	80%/0dB	80%/-1dB
	LOCATION	1.999	1.999	1.999	1.999	1.999	1.999	1.999	1.999
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy			
Level II Date 4/3-9/03	Level ___ Date ___	Level VT Date 5/6/03	___ of ___
P-Scan Limited			

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Notch Block	584-99-30-146
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SVs 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM./ACT.	WEDGE TYPE	IMAGE DATA SEE LIST
1	KB	MWB	4	8x9mm	3111		60		
2	KB	MWB	4	8x9mm	3107		60		
3									
4									

		INITIAL CALIBRATION	CALIBRATION CHECKS						
DATE		4/10/03	4/10/03						
TIME		0743	1435						
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch						
CH. 1	AMPLITUDE	80%/0dB	80%/-2dB						
	LOCATION	1.999	1.999						
CH. 2	AMPLITUDE	80%/0dB	80%/-10dB						
	LOCATION	1.999	1.999						
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy			
Level II Date 4/10/03	Level ___ Date ___	Level III Date 5/6/03	___ of ___
P-Scan Limited			

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job 03-4

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Step Block	584-99-30-145
PROCEDURE: COGEMA-SVVT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S.
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan Sys 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHz	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE (DAP / SEE / SET)
1	KB	MSEB	5	8x2mm	01934		0		
2									
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE		3/19/03	3/19/03	3/20/03	3/20/03	3/24/03	3/24/03	3/25/03	3/25/03
TIME		0845	2030	0715	1415	0855	1925	0720	1510
REFLECTOR		.3"-1.0"	.3"-1.0"	.3"-1.0"	.3-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"
CH. 1	THK.1	.301"	.295"	.304"	.292"	.301"	.301"	.304"	.290"
	THK. 2	.999/0dB	.996/2dB	.999/0dB	.998/0dB	.999/0dB	.999/-1dB	.999/0dB	.995/2dB
CH. 2	THK.1	.304	.298	.304	.295	.304	.304	.304	.292
	THK. 2	.999/0dB	.996/2dB	.999/0dB	.990/0dB	.999/0dB	.999/-1dB	.999/0dB	.990/1dB
CH. 3	THK.1	.304	.298	.304	.295	.301	.301	.304	.292
	THK. 2	.999/0dB	.996/2dB	.999/0dB	.990/0dB	.999/0dB	.999/-1dB	.999/0dB	.990/1dB
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy			___ of ___
Level II Date 3/19-25/03	Level ___ Date ___	Level ___ Date 5/4/03	
P-Scan Limited			

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job 03-4

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Step Block	584-99-30-145
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan Sys 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHz	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE (DAP / SEE / TES)
1	KB	MSEB	5	8x2 mm	01934		ϕ		
2 *	KB	MSEB	5	8x2 mm	01938		ϕ		
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS * *							
DATE		3/24/03	3/26/03	3/31/03	3/31/03	4/1/03	4/1/03	4/2/03	4/2/03
TIME		0740	2050	0900	1940	0730	1410	0815	2210
REFLECTOR		.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"
CH. 1	THK.1	.305	.302	.301	.298	.301	.298	.301	.310
	THK. 2	.999/odB	.996/odB	.999/odB	.996/odB	.999/odB	.999/1dB	.999/odB	.993/1dB
CH. 2	THK.1	.302	.298	.304	.304	.304	.301	.301	.310
	THK. 2	.999/odB	.996/odB	.999/odB	.999/1dB	.999/odB	.999/1dB	.999/odB	.996/1dB
CH. 3	THK.1	.302	.298	.304	.304	.304	.301	.301	.310
	THK. 2	.999/odB	.996/1dB	.999/odB	.999/1dB	.999/odB	.999/1dB	.999/odB	.996/1dB
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER		WHD	WHD	WDP	WDP	WDP	WDP	WDP	WDP

REMARKS

Examiner	Examiner	Reviewer	Page
W Rudy			___ of ___
Level II Date 3/31-4/1/03	Level III Date 3/26/03	Level XX Date 5/6/03	
P-Scan Limited			

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job 03-4

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Step Block	584-99-30-145
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S.
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan Sys 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHz	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE DATA SETS
1	KB	MSEB	5	8x12mm	01937		Ø		
2	KB	MSEB	5	8x12mm	01938		Ø		
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE		4/3/03	4/3/03	4/3/03	4/3/03	4/7/03	4/7/03	4/7/03	4/7/03
TIME		0755	0755	1430	1430	0715	0715	1545	1545
REFLECTOR		.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"
CH. 1	THK.1	.304	.301	.304	.301	.304	.304	.304	.304
	THK. 2	.999/0dB	.999/0dB	.999/1dB	.999/1dB	.999/0dB	.999/0dB	.999/1dB	1.002/0dB
CH. 2	THK.1	.304	.301	.304	.301	.304	.304	.304	.304
	THK. 2	.999/0dB	.999/0dB	1.002/1dB	1.002/1dB	.999/0dB	.999/0dB	.999/1dB	1.002/0dB
CH. 3	THK.1	.304	.301	.304	.304	.304	.304	.304	.304
	THK. 2	.999/0dB	.999/0dB	1.002/1dB	.999/2dB	.999/0dB	.999/0dB	.999/1dB	1.002/0dB
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy			___ of ___
Level II Date 4/3-7/03	Level ___ Date ___	Level XX Date 5/6/03	
P-Scan Limited			

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job 03-4

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Step Block 584-99-30-145	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S.
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/4
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE
1	KB	MSEB	5	8x2mm	01937		ϕ		
2	KB	MSEB	5	8x2mm	01938		ϕ		
3									
4									

		INITIAL CALIBRATION	CALIBRATION CHECKS						
DATE		4/8/03	4/8/03	4/8/03	4/8/03	4/9/03	4/9/03	4/9/03	4/9/03
TIME		0713	0713	1410	1410	0700	0700	1400	1400
REFLECTOR		.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"
CH. 1	THK.1	.301	.304	.289	.301	.301	.301	.290	.301
	THK. 2	.999/0dB	.999/0dB	.990/1dB	.996/1dB	.999/0dB	.999/0dB	.990/-1dB	.999/1dB
CH. 2	THK.1	.301	.304	.290	.301	.301	.301	.292	.298
	THK. 2	.999/0dB	.999/0dB	.993/1dB	.990/1dB	.999/0dB	.999/0dB	.990/-1dB	.999/0dB
CH. 3	THK.1	.301	.304	.290	.301	.301	.301	.292	.301
	THK. 2	.999/0dB	.999/0dB	.993/1dB	.996/1dB	.999/0dB	.999/0dB	.990/1dB	.999/0dB
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS

Examiner: W D Rudd (signature) Level II Date 4/8-9/03 P-Scan Limited	Examiner Level ___ Date ___	Reviewer: (signature) Level III Date 5/4/03	Page ___ of ___

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job 03-4

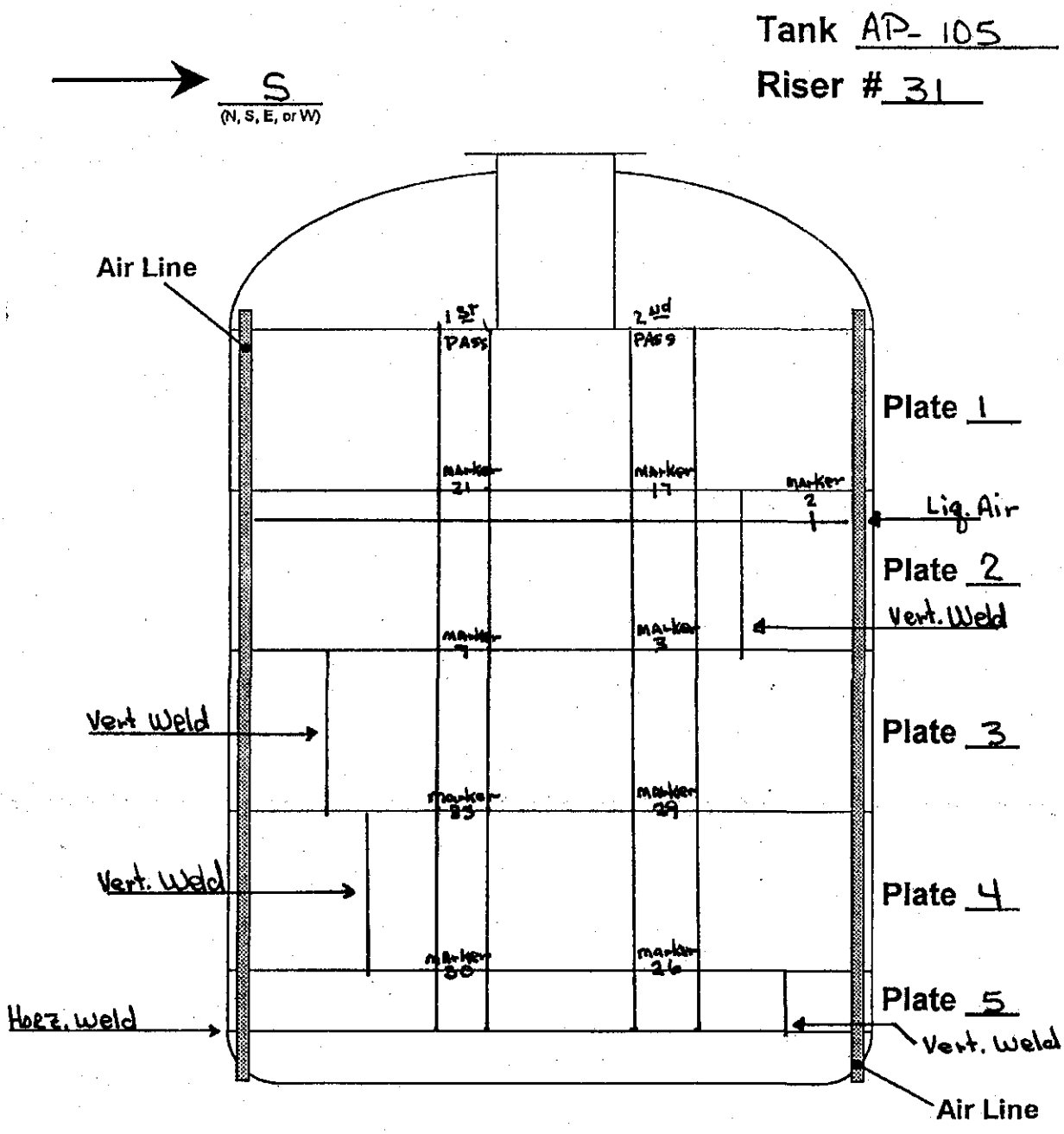
LOCATION: 200 EAST TANK FARM	SYSTEM: AP-105	CALIBRATION BLOCK: Step Block	584-99-30-145
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S.
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #:

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE DATA SET
1	KB	MSEB	5	8X2mm	01935		0		
2	KB	MSEB	5	8X2 mm	01996		0		
3									
4									

	INITIAL CALIBRATION				CALIBRATION CHECKS				
DATE		4/10/03	4/10/03	4/10/03	4/10/03				
TIME		0730	0730	1430	1430				
REFLECTOR		.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"				
CH. 1	THK.1	.304	.304	.307	.301				
	THK. 2	.999/odB	.999/odB	.999/odB	.999/odB				
CH. 2	THK.1	.304	.304	.304	.301				
	THK. 2	.999/odB	.999/odB	.999/odB	.999/odB				
CH. 3	THK.1	.304	.304	.304	.304				
	THK. 2	.999/odB	.999/odB	1.002/odB	.999/odB				
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
WD Purdy			___ of ___
Level II Date 5/10/03	Level II Date 5/9/03	Level III Date 5/9/03	
P-Scan Limited			


Tank AP-105
Riser # 31
S
(N, S, E, or W)
Air Line
1st PASS
2nd PASS
Plate 1
marker 21
marker 17
marker 2
Liq. Air
Plate 2
Vert. Weld
marker 7
marker 3
Vert Weld
Plate 3
marker 33
marker 29
Vert. Weld
Plate 4
marker 30
marker 26
Plate 5
Horz. weld
Vert. Weld
Air Line

May 7th. 2003

Mr. Daron Tate
COGEMA Engineering Corp.
2425 Stevens Center
Richland, WA. 99352

This letter is to certify that I have analyzed the P-scan automated ultrasonic data from Hanford waste tank AP 105. The data reviewed for the primary tank wall was collected by Mr. Nelson and Mr. Purdy March 19th. through April 16th. 2003. The data is acceptable. The data from vertical strips, vertical welds, horizontal weld and liquid to air interface was analyzed to the requirements of COGEMA procedure SVUT-INS-007.3 Revision 1.

There were no reportable indications. No cracking, reportable pitting or other reportable thinning was detected in any of the areas examined.

Sincerely,

James B. Elder
ASNT UT Level III

CC: Mr. W. H. Nelson - COGEMA

ATTACHMENT 3

ULTRASONIC EXAMINATION OF DOUBLE-SHELL TANK 241-AP-105
EXAMINATION COMPLETED APRIL 2003
(PNNL THIRD PARTY REVIEW)

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PNNL-14293 Rev. 0

Ultrasonic Examination of Double-Shell Tank 241-AP-105 Examination Completed April 2003

AF Pardini
GJ Posakony

May 2003

Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76RL01830

Pacific Northwest National Laboratory
Richland, Washington 99352

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Summary

COGEMA Engineering Corporation (COGEMA), under a contract from CH2M Hill Hanford Group (CH2M Hill), has performed an ultrasonic nondestructive examination of selected portions of Double-Shell Tank 241-AP-105. The purpose of this examination was to provide information that could be used to evaluate the integrity of the wall of the primary tank. The requirements for the ultrasonic examination of Tank 241-AP-105 were to detect, characterize (identify, size, and locate), and record measurements made of any wall thinning, pitting, or cracks that might be present in the wall of the primary tank. Any measurements that exceed the requirements set forth in the Engineering Task Plan (ETP), RPP-11832 (Jensen 2002), are reported to CH2M Hill and the Pacific Northwest National Laboratory (PNNL) for further evaluation. Under the contract with CH2M Hill, all data is to be recorded on disk and paper copies of all measurements are provided to PNNL for third-party evaluation. PNNL is responsible for preparing a report(s) that describes the results of the COGEMA ultrasonic examinations.

Examination Results

The results of the examination of Tank 241-AP-105 have been evaluated by PNNL personnel. The examination consisted of two 15-in. wide scans over the entire height of the tank, the heat-affected zone (HAZ) of four vertical welds and one horizontal weld, and a single 15-in. wide horizontal scan of the liquid/air interface. The examination was performed to detect any wall thinning, pitting, or cracking in the primary tank wall.

Primary Tank Wall Vertical Scan Paths

Two 15-in.-wide vertical scan paths were performed on Plates #1, #2, #3, #4, and #5. The plates were examined for wall thinning, pitting, and cracks oriented vertically on the primary tank wall. There were no areas that exceeded the reportable level of 10% of the nominal thickness. No pitting or vertical crack-like indications were detected in Plates #1, #2, #3, #4, or #5.

Primary Tank Wall Weld Scan Paths

The HAZs of vertical welds in Plates #2, #3, #4, and #5 were examined for wall thinning, pitting, and cracks oriented either perpendicular or parallel to the weld. There were no areas that exceeded the reportable level of 10% of the nominal thickness. No pitting or crack-like indications were detected in the weld areas in Plates #2, #3, #4, or #5.

The HAZ of the horizontal weld between Plate #5 and the tank knuckle was examined for wall thinning, pitting and cracks oriented either perpendicular or parallel to the weld. There were no areas that

exceeded the reportable level of 10% of the nominal thickness. No pitting or crack-like indications were detected in the weld areas on Plate #5 side or on the knuckle side of the horizontal weld.

Primary Tank Wall Liquid/Air Interface Horizontal Scan Path

A 15-in.-wide horizontal scan path was performed on Plate #2 in an area considered the liquid/air interface region. The liquid/air interface region was examined for wall thinning, pitting, and cracks oriented in a circumferential direction on the primary tank wall. There were no areas that exceeded the reportable level of 10% of the nominal thickness. No pitting or circumferentially oriented crack-like indications were detected in the liquid/air interface region on Plate #2.

Contents

Figures

1.0 Introduction

COGEMA Engineering Corporation (COGEMA), under a contract from CH2M Hill Hanford Group (CH2M Hill), has performed an ultrasonic nondestructive examination (UT) of selected portions of Double-Shell Tank (DST) 241-AP-105. The purpose of this examination was to provide information that could be used to evaluate the integrity of the DST. The requirements for the UT of Tank 241-AP-105 were to detect, characterize (identify, size, and locate), and record measurements made of any wall thinning, pitting, or cracks that might be present in the wall of the primary tank. Any measurements that exceed the requirements set forth in the Engineering Task Plan (ETP), RPP-11832 (Jensen 2002), are reported to CH2M Hill and the Pacific Northwest National Laboratory (PNNL) for further evaluation. Specific measurements that are reported include the following:

- Wall thinning that exceeds 10% of the nominal thickness of the plate.
- Pits with depths that exceed 25% of the nominal plate thickness.
- Stress-corrosion cracks that exceed 0.10-in. (through-wall) that are detected in the inner wall of the tank, heat-affected zone (HAZ) of welds, or in the tank knuckle.

The accuracy requirements for ultrasonic measurements for the different types of defects are as follows:

- Wall thinning – measure thickness within ±0.020-in.
- Pits – size depths within ±0.050-in.
- Cracks – size the depth of cracks on the inner wall surfaces within ±0.1-in.
- Location – locate all reportable indications within ±1.0-in.

Under the contract with CH2M Hill, all data is to be recorded on disk and paper copies of all measurements are provided to PNNL for third-party evaluation. PNNL is responsible for preparing a report(s) that describes the results of the COGEMA UT.

2.0 Qualified Personnel, Equipment, and Procedure

Qualification of personnel participating in the DST inspection program, the UT equipment (instrument and mechanical scanning fixture), and the UT procedure that will be used in the examination of the current DST is required by CH2M Hill. Personnel participating in the examinations are to be certified in accordance with the American Society for Nondestructive Testing (ASNT) Guideline SNT-TC-1A-92 and associated documentation is to be provided. The capability of the UT system is to be validated through a performance demonstration test (PDT) administered by PNNL on a mock-up simulating the actual DST. The current procedure for the UT is to be based on the Section V, Article 4, *Boiler and Pressure Vessel Code* defined by the American Society for Mechanical Engineers (ASME).

2.1 Personnel Qualifications

The following individuals were qualified and certified to perform UT of the Hanford DST 241-AP-105:

- **Mr. Wesley Nelson**, ASNT Level III (#LM-1874) in UT, has been identified as COGEMA's UT Level III authority for this project. Mr. Nelson has been certified by COGEMA as a UT Level III in accordance with COGEMA procedure COGEMA-SVCP-PRC-014, latest revision. Further documentation has been provided to establish his qualifications. Reference: Letter from PNNL to C.E. Jensen dated August 22, 2000, "Report on Performance Demonstration Test – PDT, May 2000."

- **Mr. James B. Elder**, ASNT Level III (#JM-1891) in UT, has been contracted by COGEMA to provide peer review of all DST UT data. Mr. Elder has been certified by JBNDT as a UT Level III in accordance with JBNDT written practice JBNDT-WP-1, latest revision. Further documentation has been provided to establish his qualifications. Reference: PNNL-11971, *Final Report - Ultrasonic Examination of Double-Shell Tank 241-AN-107.*

- **Mr. William D. Purdy**, COGEMA UT Level II limited (for P-Scan data acquisition only). Mr. Purdy has been certified in accordance with COGEMA procedure COGEMA-SVCP-PRC-014, latest revision. Further documentation has been provided to establish his qualifications. Reference: Letter from PNNL to C.E. Jensen dated October 5, 2001, "Purdy Performance Demonstration Test (PDT) Report."

2.2 Ultrasonic Examination Equipment

CH2M Hill has provided the UT equipment for the examination of Tank 241-AP-105. This equipment consists of a Force Institute P-Scan ultrasonic test instrument and a Force Institute AWS-5D remote-controlled, magnetic-wheel crawler for examining the primary tank wall. Ultrasonic transducers used for the examinations are commercial off the shelf. The P-Scan ultrasonic system has been qualified through a PDT administered by PNNL. Reference: PNNL-11971, *Final Report- Ultrasonic Examination of Double-Shell Tank 241-AN-107.*

2.3 Ultrasonic Examination Procedure

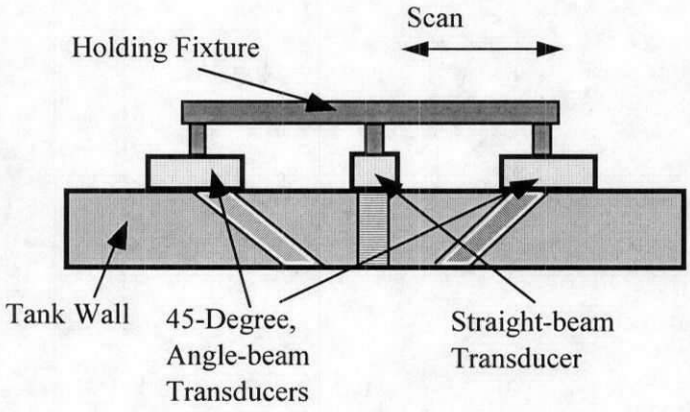
COGEMA has provided the UT procedure for the examination of Tank 241-AP-105. This procedure, COGEMA-SVUT-INS-007.3, Revision 1, outlines the type of UT and mechanical equipment that are to be used as well as the types of transducers. Both straight-beam and angle-beam transducers are used for the examination of the primary tank wall. The examination procedures include full documentation on methods for calibration, examination, and reporting. Hard copies of the T-Scan (thickness) and P-Scan (projection or angle beam) views of all areas scanned are made available for analysis. The UT procedure requires the use of specific UT transducers for the different examinations. A calibration performed before and after the examinations insures that each transducer used in the inspection is adjusted and that the entire system is performing correctly. The COGEMA UT procedure has been qualified through a PDT. Reference: PNNL-11971, *Final Report - Ultrasonic Examination of Double-Shell Tank 241-AN-107.*

3.0 Ultrasonic Examination Configuration

COGEMA is required to inspect selected portions of the DSTs which may include the primary and secondary tank walls, the HAZ of the primary tank vertical and horizontal welds, and the tank knuckle and bottoms. The P-Scan system has been configured to perform these examinations and has been performance tested. The examination of Tank 241-AP-105 included UT of the primary tank wall and the HAZ of selected welds in the primary tank wall.

3.1 Primary Tank Wall Transducer Configuration

Figure 3.1 provides an example of the scanning configuration generally used during an examination of the primary tank wall. However, other configurations can be used at the discretion of the COGEMA UT Level III (i.e., 45-degree transducers can be removed for simple wall thickness measurements). The functional diagram in Figure 3.1 shows one straight-beam and two angle-beam transducers ganged together for examining the primary tank wall. The straight beam is designed to detect and record wall thinning and pits, and the angle beams are designed to detect and record any cracking that may be present. These transducers are attached to the scanning bridge and they all move together. Information is captured every 0.035-in. (or as set by the NDE inspector) as the assembly is scanned across a line. At the end of each scan the fixture is indexed 0.035-in. (or as set by the NDE inspector) and the scan is repeated. The mechanical scanning fixture is designed to scan a maximum of 15-in. and then index for the next scan. The hard copy provides a permanent record that is used for the subsequent analysis.



Transducer Specifications:

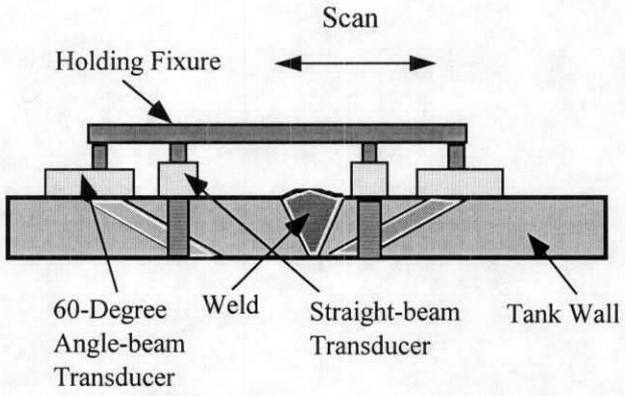
Angle-beam
Type: MWB-45 04E
Frequency : 4 MHz
Size: 8 X 9 mm.
Manufacturer: Krautkramer

Straight-beam
Type: MSEB 5B
Frequency: 5 MHz
Size: Dual - 8 X 2 mm
Manufacturer: Krautkramer

Figure 3.1. Transducer Configuration for Examining the Primary Tank Wall

3.2 Weld Zone Transducer Configuration

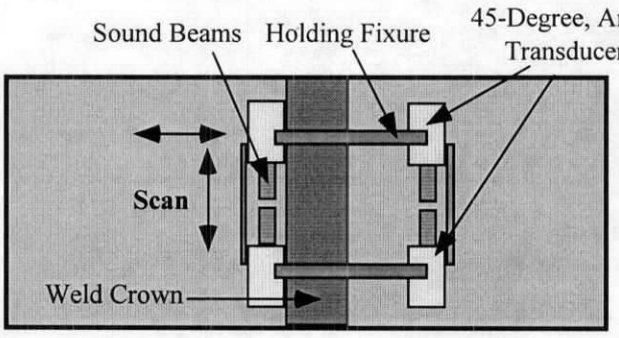
Figure 3.2 is a functional sketch that shows the configurations for examination of the weld zone. The area of interest (HAZ of the weld) is shown as lying adjacent to the weld. Both cracks and pitting may occur in this region. The "A" portion of this sketch shows the 60-degree angle-beam transducers used for detecting cracks parallel to the weld. The straight-beam transducers in this sketch are used for detecting and recording any pitting or wall thinning that may be present. All transducers are ganged together. The scanning distance traveled is limited to a total of approximately 5.0-in. The sketch titled "B" shows the arrangement for detecting cracks that may lie perpendicular to the weld. Four 45-degree, angle-beam transducers are used for this inspection. Again the transducers are ganged together but the scan is limited to a total of approximately 4.0-in. The weld zone requirements are shown in Figure 3.3. The scan protocol, data capture, and index are the same for examining other weld areas in the tank.



A. Configuration for pitting and cracks parallel to weld

Transducer Specifications:
Angle-Beam
Type: MWB-60 04E
Frequency: 4 MHz
Size: 8 X 9 mm
Manufacturer: Krautkramer

Straight-beam
Type: MSEB 5B
Frequency: 5MHz
Size: Dual - 2 X 8 mm
Manufacturer: Krautkramer

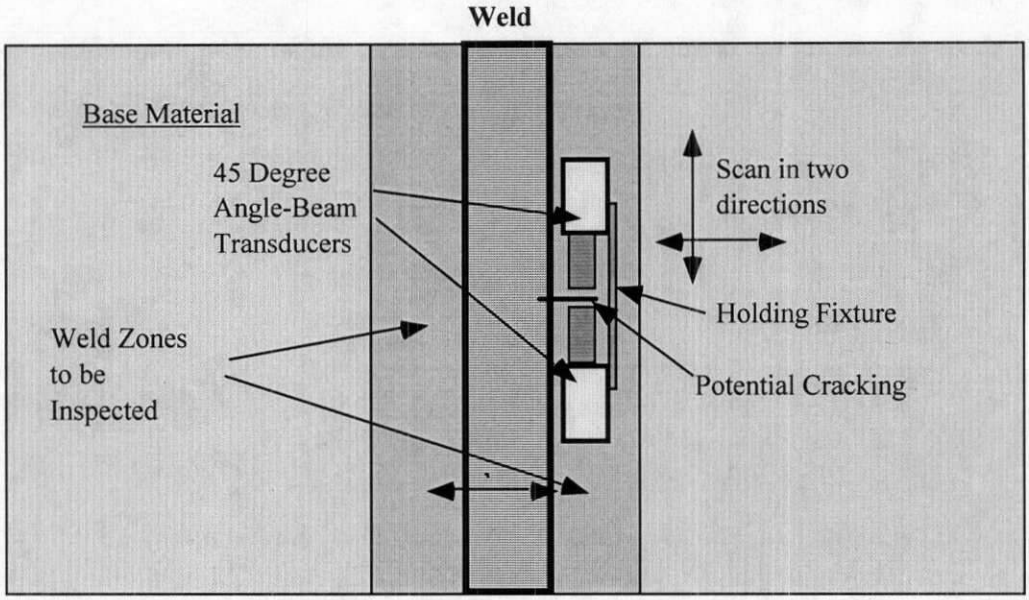


B. Configuration for cracks perpendicular to weld

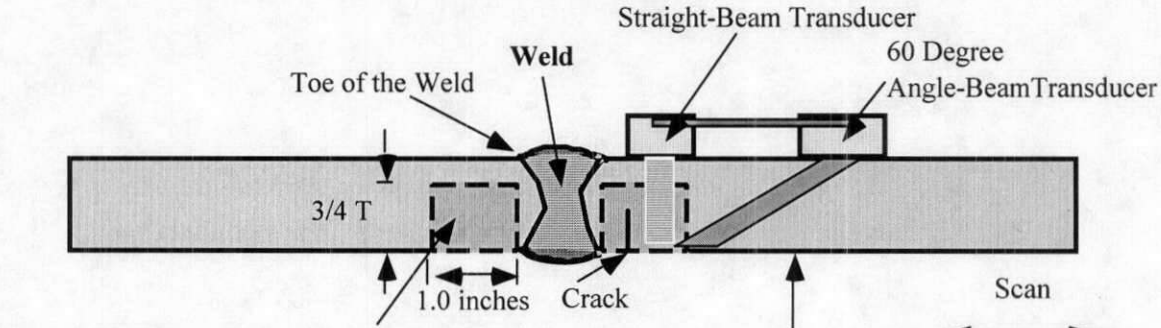
Transducer Specifications:
Angle-beam
Type: MWB-45 04E
Frequency: 4 MHz
Size: 8 X 9 mm
Manufacturer: Krautkramer

Figure 3.2. Transducer Configurations for Examination of Weld Zone in the Primary Tank Wall

In the HAZ, the requirement for characterizing cracks that lie perpendicular or parallel to welds in the primary tank wall is described in Figure 3.3. The HAZs are located on either side of the weld and defined as being within 1-in. of the weld and on the inner three-quarters of the thickness (3/4T) of the plate. These zones are considered most likely to experience stress-corrosion cracking.



Top View - - - Cracks Perpendicular to Weld



A zone 3/4 T from the inner surface and 1.0 inches from the toe of the weld is to be ultrasonically examined for cracking, corrosion or pitting. Examinations to be made on both sides of the weld.

End View - - - Cracks Parallel to Weld

Figure 3.3. Views of the Weld Zone to be Ultrasonically Examined in the Primary Tank Wall

4.0 Ultrasonic Examination Location

Tank 241-AP-105 is located in the Hanford 200 East area in AP Tank Farm. The crawler and associated scanner were lowered into the 24-in. riser located on the west side of 241-AP-105 and designated as Riser 31. Riser 31 was originally called out as Riser 6 West. Figure 4.1 provides a graphic of the location of this riser.

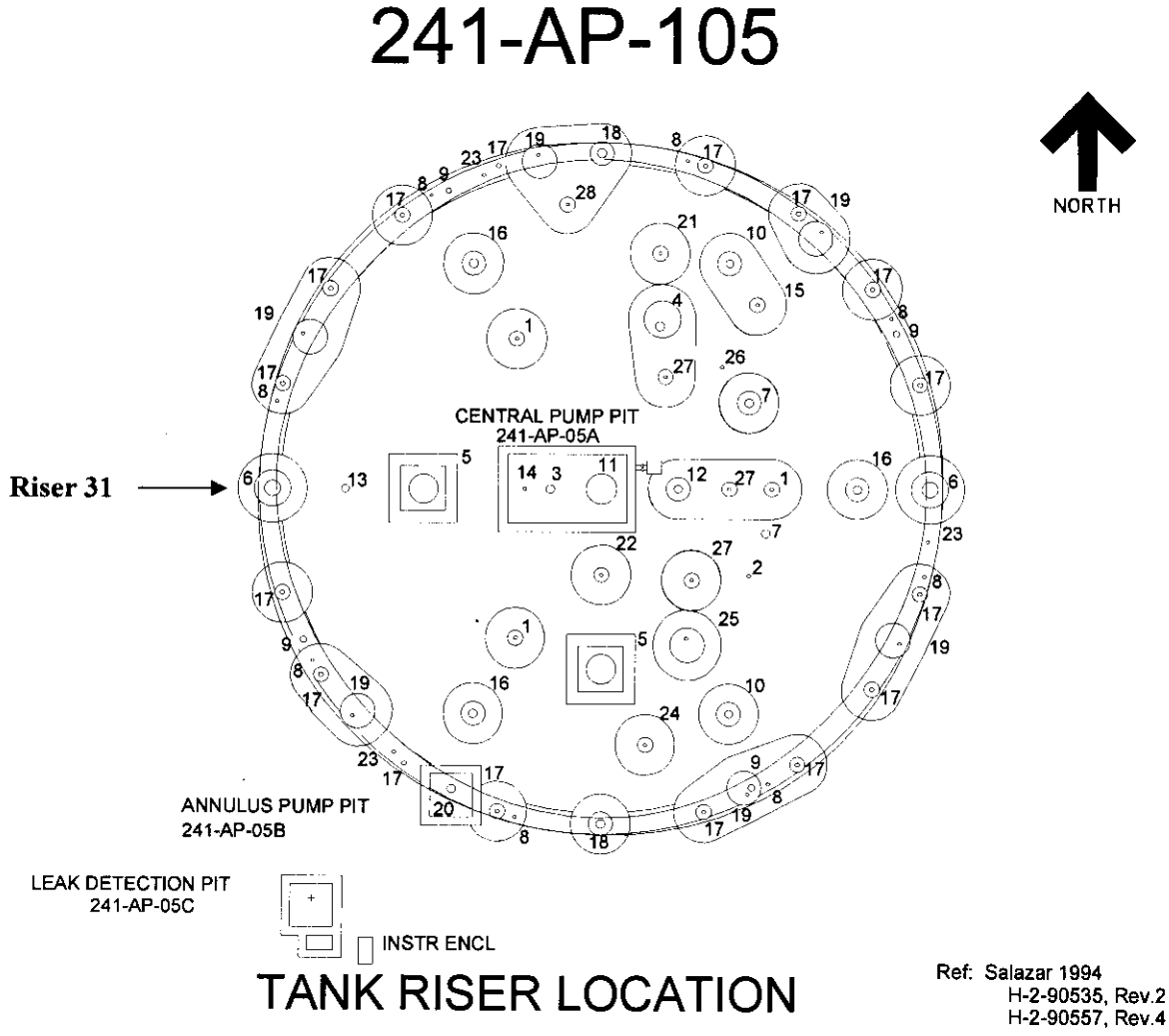


Figure 4.1. UT of 241-AP-105 from Riser 31

Figure 4.2 describes the areas on the primary wall of Tank 241-AP-105 that were ultrasonically examined. Two 15-in.-wide vertical scan paths were performed on Plates #1, #2, #3, #4, and #5 below the entrance to Riser 31 at approximately 24-in. from the center of each scan to the center of the riser. Vertical weld HAZ examinations were done on Plates #2, #3, #4, and #5, and the horizontal weld HAZ examination was done on the transition Plate #5 to knuckle weld. A single 15-in. wide scan was performed in the liquid/air region on Plate #2.

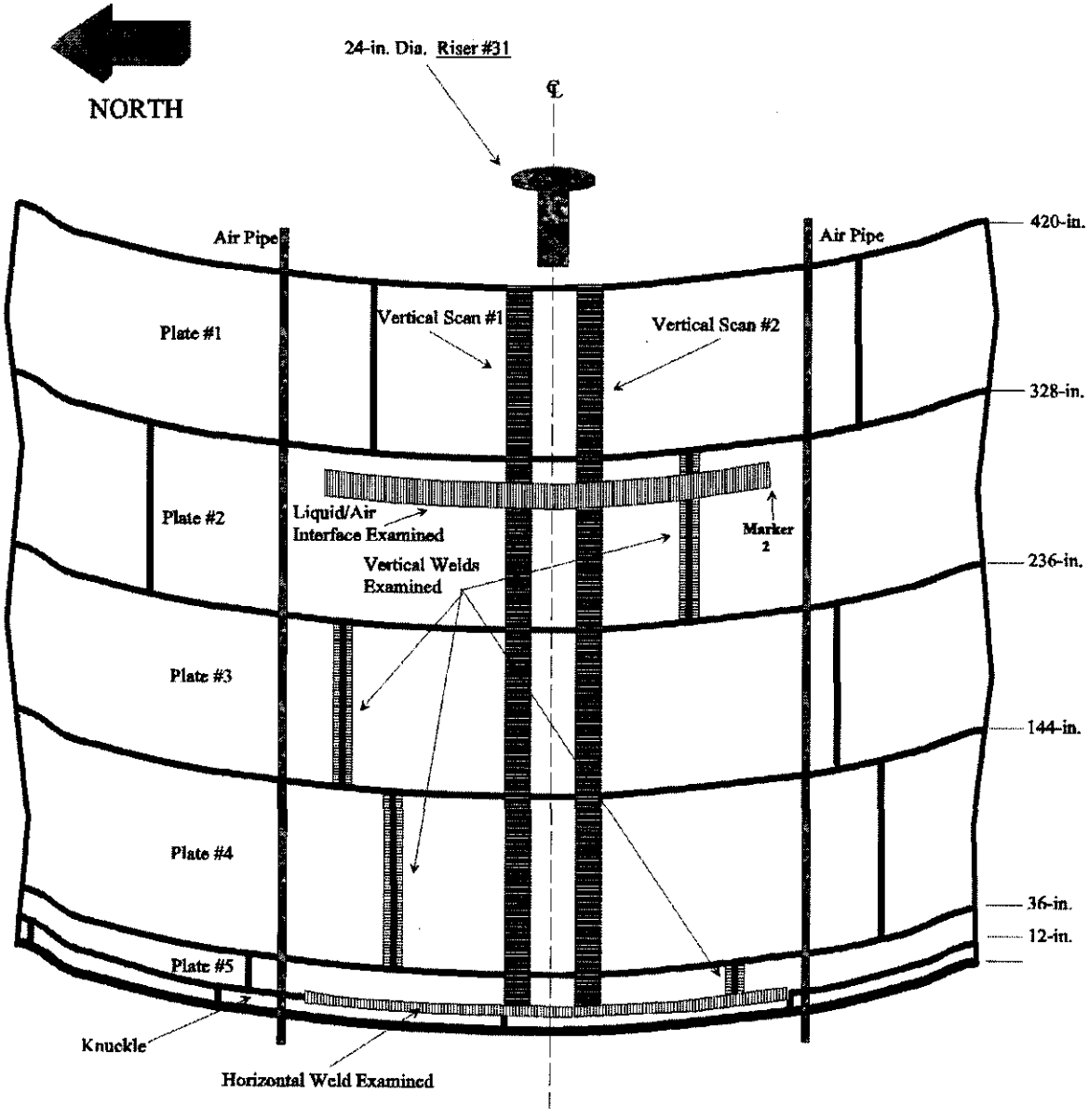


Figure 4.2. Sketch of Scan Paths on Tank 241-AP-105

5.0 Ultrasonic Examination Results

COGEMA has provided detailed reports including T-Scan and P-Scan hard copies of all areas that were ultrasonically examined to PNNL for third-party review. The data was analyzed by COGEMA Level III Mr. Wes Nelson and peer reviewed by JBNDT Level III Mr. Jim Elder. The results of the examination of Tank 241-AP-105 are presented in Figures 5.1 and 5.2.

Figures 5.1 and 5.2 show the wall thickness examination results for the primary tank wall and the HAZs of both vertical and horizontal welds. The examination consisted of two vertical paths beneath the 24-in. diameter riser. Vertical scan #1 was 15-in. wide on Plates #1, #2, #3, #4, and #5 and started approximately 30-in. north of the centerline of the 24-in. riser. Vertical scan #2 was also 15-in. wide on Plates #1, #2, #3, #4, and #5 and ended 30-in. south of the centerline of the 24-in. riser. The HAZs of vertical welds in Plates #2, #3, #4, and #5 were examined and the HAZ in the horizontal weld between Plate #5 and the knuckle section was also examined. A 15-in. wide scan was performed in the liquid/air interface region on Plate #2, beginning at marker 2 located just north of the south air pipe. Areas in the figures that show two measurements in the same box are the result of the vertical scan paths overlapping the horizontal HAZ scan paths. Figures 5.1 and 5.2 display the minimum readings taken in each 15-in. wide by 12-in. long area of the scan. In the overlapping areas, both minimum readings from each of vertical and horizontal scan paths are given.

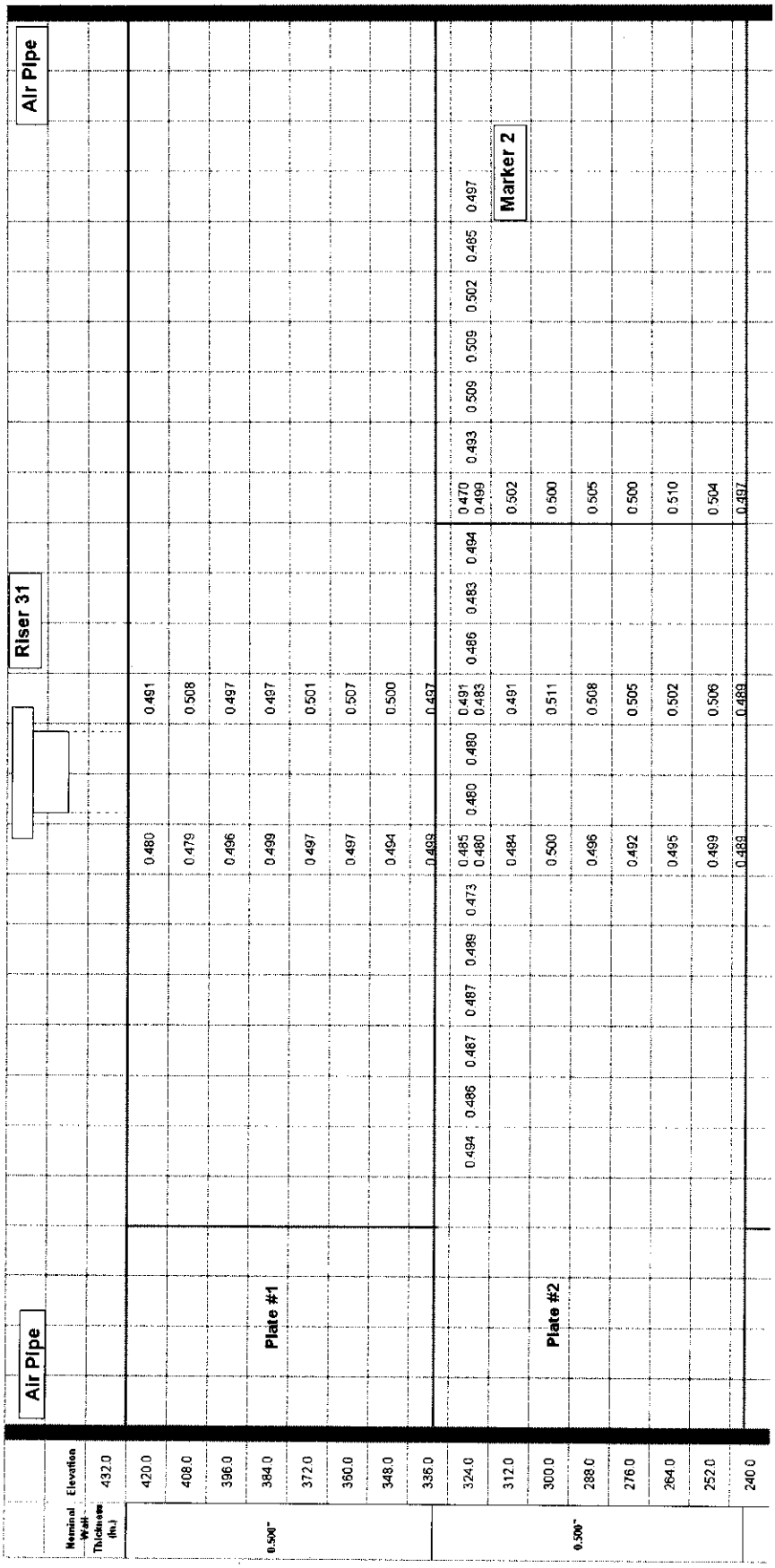


Figure 5.1. UT Data from Tank 241-AP-105

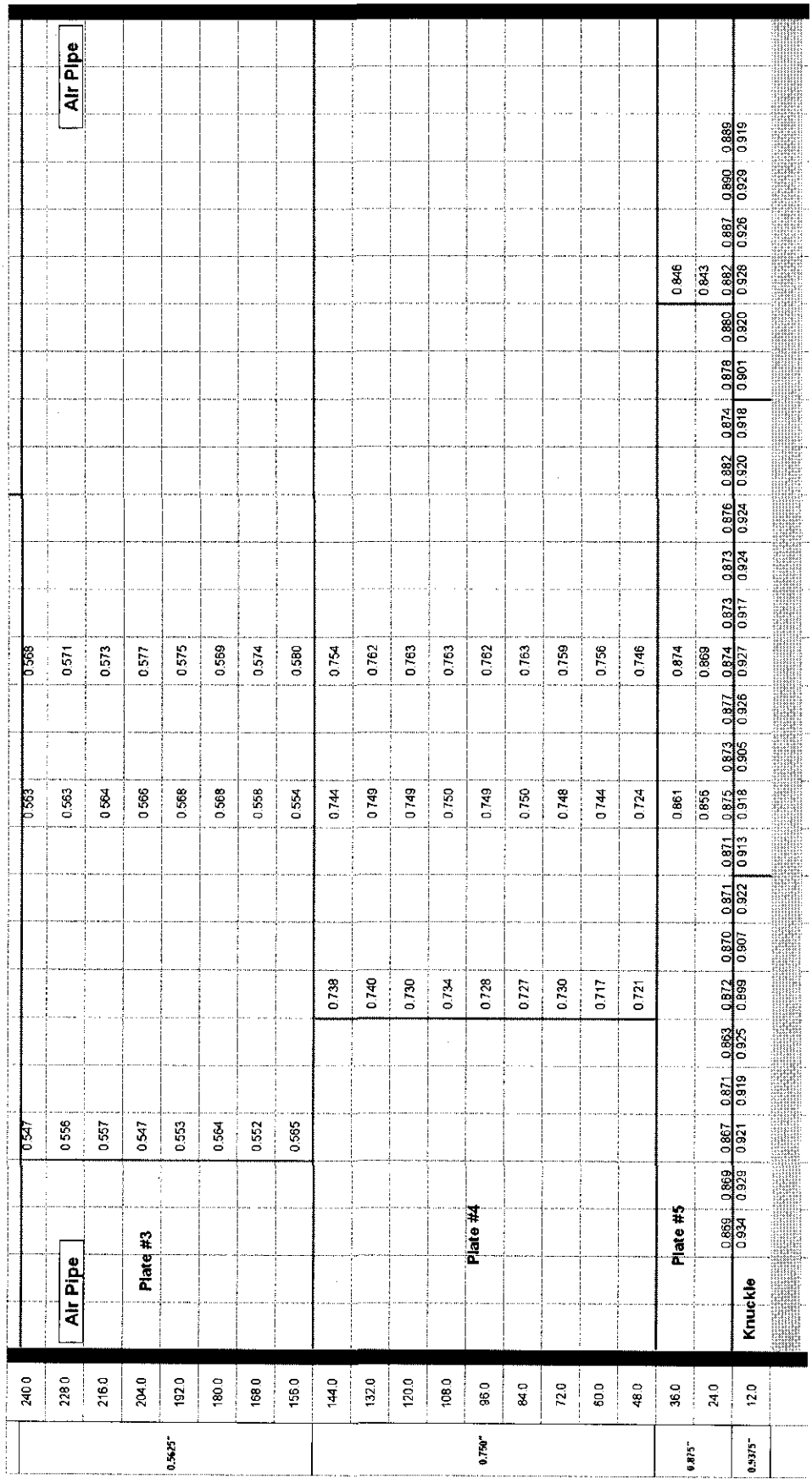


Figure 5.2. UT Data from Tank 241-AP-105 cont.

6.0 Conclusions

The results of the examination of Tank 241-AP-105 have been evaluated by PNNL personnel. The examination consisted of two 15-in. wide scans over the entire height of the tank, the HAZs of 4 vertical welds and 1 horizontal weld, and a single 15-in. wide scan of the liquid/air interface region. The examination was performed to detect any wall thinning, pitting, or cracking in the primary tank wall.

6.1 Primary Tank Wall Vertical Scan Paths

Two 15-in.-wide scan paths were performed on Plates #1, #2, #3, #4, and #5. The plates were examined for wall thinning, pitting, and cracks oriented vertically on the primary tank wall. The results indicated that the minimum thicknesses in the areas scanned with nominal thickness of 0.500-in. were as follows; Plate #1 was 0.479-in. and Plate #2 was 0.484-in. The nominal thickness in Plate #3 is 0.5625-in. and the minimum thickness in this area was 0.554-in. The nominal thickness in Plate #4 is 0.750-in. and the minimum thickness in this area was 0.724-in. The nominal thickness in Plate #5 is 0.875-in. and the minimum thickness in this area was 0.856-in. There were no areas that exceeded the reportable level of 10% of the nominal thickness. No pitting or vertical crack-like indications were detected in Plates #1, #2, #3, #4, or #5.

6.2 Primary Tank Wall Weld Scan Paths

The HAZs of vertical welds in Plates #2, #3, #4, and #5 were examined for wall thinning, pitting and cracks oriented either perpendicular or parallel to the weld. The results indicated that the minimum thicknesses in the weld areas scanned were as follows: The nominal thickness of Plate #2 is 0.500-in. and the minimum thickness in this weld area was 0.470-in. The nominal thickness in Plate #3 is 0.5625-in. and the minimum thickness in this weld area was 0.547-in. The nominal thickness in Plate #4 is 0.750-in. and the minimum thickness in this weld area was 0.717-in. The nominal thickness in Plate #5 is 0.875-in. and the minimum thickness in this weld area was 0.843-in. There were no areas that exceeded the reportable level of 10% of the nominal thickness. No pitting or crack-like indications were detected in the weld areas in Plates #2, #3, #4, or #5.

The HAZ of the horizontal weld between Plate #5 and the tank knuckle was examined for wall thinning, pitting and cracks oriented either perpendicular or parallel to the weld. The results indicated that the minimum thickness in the weld area with nominal thickness of 0.875-in. on Plate #5 was 0.863-in. The minimum thickness in the weld area with nominal thickness of 0.9375-in. on the knuckle was 0.899-in. There were no areas that exceeded the reportable level of 10% of the nominal thickness. No pitting or crack-like indications were detected in the weld areas on Plate #5 side or on the knuckle side of the horizontal weld.

6.3 Primary Tank Wall Liquid/Air Interface Horizontal Scan Path

A 15-in.-wide horizontal scan path was performed on Plate #2 in an area considered a liquid/air interface region. The liquid/air interface region was examined for wall thinning, pitting, and cracks oriented in a circumferential direction on the primary tank wall. The results indicated that the minimum thickness in the areas scanned in Plate #2 with nominal thickness of 0.500-in. was 0.473-in. There were no areas that exceeded the reportable level of 10% of the nominal thickness. No pitting or circumferentially oriented crack-like indications were detected in the liquid/air interface region on Plate #2.

7.0 References

Jensen, C. E., 2002, *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks FY2003*, RPP-11832, Rev 0, September 2002, CH2M Hill Hanford Group, Inc., Richland, Washington.

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